



13th Annual Conference of
Indian Society of Hospital Waste Management

ISHWMCON 2013

6th – 8th December, 2013

Table Talk to Bin's Side - A Practical Solution



Organized by

BIO MEDICAL WASTE MANAGEMENT CELL

**King George's Medical University,
Lucknow**

About the University

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SOPHEA

In 1870, the Maharaja of Vijaynagaram first floated the idea of starting a medical college in Lucknow. It was in 1905 that, to commemorate the visit of Prince of Wales to India, the Raja of Jehangirabad and Sir Taussuduq Rasool requested the Raja of Ayodhya to persuade Sir James LaTouche, Lt. Governor of United Provinces (now Uttar Pradesh) to recommend the establishment of the medical college to the Governor of India. This time the Government gave its sanction but with the condition that the people of United Provinces raise a sum of Rs 8 lacs.

The medical college was formally opened in October 1911, the year when His Majesty King George V and Queen Mary visited India, by the then Lt. Governor of United Provinces - Sir John Prescott Hewett. Every year since 1916, the 'topper' of the Final Professional Examination is decorated with the 'Hewett Medal' in honor of the man. Col. W. Selby was the first Principal and Professor of Surgery and Lt. Col. C. A. Sprawson was the first physician. Initially, the college was affiliated to the Allahabad University.

The first hospital associated with King George's Medical University was built in 1914. A 226 bed hospital was formally inaugurated by the Viceroy Lord Harding on the 10th January 1914. The first postgraduate examination in Medicine and Pathology was held in 1918. The King George's Medical University and associated King George's Hospital were formally transferred under the Lucknow University in 1921, on the establishment of the University of Lucknow.

In 1951, a 3 storied building called Gandhi Memorial Hospital was constructed for medical cases with a bed strength of 144. It was at this stage that the name King George's Hospital was changed to Gandhi Memorial & Associated Hospitals. In 1955 another block housing the Children's Hospital was added. Yet another block was built for the Surgery department. The Departments of Orthopedic Surgery, E.N.T. and Anesthesia were also created in the fifties. The speciality departments of Neurology, Cardiology, Psychiatry and Plastic Surgery came up in the seventies.

The surgical superspeciality departments of Urology, Cardiothoracic & Vascular Surgery and Surgical Oncology were carved out from the Department of Surgery in 1998.

A major milestone in the history of this institution is its conversion and upgradation as the King George's Medical University. This came about by an act passed on the 16th September 2002 by the Government of Uttar Pradesh under Chief Minister Sushree Mayawati. This is the only medical university in the north and one of 3 such universities in the country.

Dental education at the King George's Medical University started initially as a Dentistry Wing of the Department of Surgery in 1949. The BDS course was also started in the same year.



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ISHWMCON 2013



BIO MEDICAL WASTE MANAGEMENT CELL

Organizing Committee

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Hon'ble Vice Chancellor

Organizing Chairperson

Dr. S.N. Sankhwar

Chief Medical Superintendent

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Co-Organizing Secretary

Dr. Anupam Wakhlu

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Dr. Tulika Chandra

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Dr. K.P. Singh

Dr. Abhishek Singh

Dr. Rajeev Agarwal



Scientific Committee

Dr. Anupam Wakhlu
 Dr. Kirti Srivastava
 Dr. Reema Kumari
 Dr. Mohd. Parvez Khan
 Dr. Anil Chandra
 Dr. Rajesh Verma
 Ms. Anshita Singh

Registration & Reception Committee

Dr. Punita Manik (Convener)
 Dr. Reema Kumari
 Dr. Bandana Gupta
 Dr. Anuradha Nischal
 Mr. Ashutosh Sharma
 Ms. Anshita Singh
 Mr. Parvez Naim Khan

Finance Committee

Dr. Kirti Srivastava
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 Dr. Shalini Kaushal
 Dr. Kirti Srivastava
 Dr. Reema Kumari
 Dr. Anupam Wakhlu
 Dr. Balendra P. Singh
 Dr. Mohd. Parvez Khan

Souvenir committee (All printing work)

Dr. Reema Kumari
 Dr. Mohd. Parvez Khan
 Dr. Dileep Kumar Verma
 Dr. K.K. Agarwal
 Ms. Anshita Singh

Catering/Food Committee

Dr. Anupam Wakhlu
 Dr. Mohd. Parvez Khan
 Dr. K.K. Sawlani
 Dr. Anurag Tripathi
 Mr. Awdhesh

Transportation & Accommodation Committee

Dr. Sunit Jurel (Convener)
 Dr. Sudhir Singh
 Mr. Atul
 Mr. Ashok

Entertainment Committee

Dr. Vijay Kumar (Plastic Surgery)
 Dr. Lakshya Kumar
 Dr. R. K. Deewan





BIO MEDICAL WASTE MANAGEMENT CELL

Categories as per Draft Bio-Medical Waste (Management and Handling) Rules, 2011 (Schedule I)

Category	Waste category (type)	Treatment and disposal option
1	Human Anatomical Waste (Human tissues, organs, body parts)	Incineration ^{@@}
2	Animal Waste (Animal tissues, organs, body parts, carcasses, bleeding parts, uid, blood and experimental animals used in research, waste generated by veterinary hospitals/colleges, discharge from hospitals, animal houses)	Incineration ^{@@}
3	Microbiology & Biotechnology Waste and other Laboratory Waste (Wastes from clinical samples, pathology, bio-chemistry, haematology, blood bank, laboratory cultures, stocks or specimens of micro- organisms, live or attenuated vaccines, human and animal cell culture used in research, infectious agents from research and industrial laboratories, wastes from production of biological toxins, dishes and devices used for transfer of cultures)	Disinfection at source by chemical treatment [@] or by autoclaving/microwaving followed by mutilation/shredding ^{##} and after treatment nal disposal in secured land ll, or disposal of recyclable wastes (plastics or glass) through registered or authorized recyclers
4	Waste Sharps (Needles, glass syringes or syringes with xed needles, scalpels, blades, glass, etc. that may cause punctures and cuts. This includes both used and unused sharps)	Disinfection by chemical treatment [@] or destruction by needle and tip-cutters, autoclaving or microwaving followed by mutilation or shredding ^{##} , whichever is applicable, and nal disposal through authorized CBWTF or disposal in secured land ll or designated concrete waste sharps pit
5	Discarded Medicines and Cytotoxic Drugs (Wastes comprising of outdated, contaminated and discarded medicines)	Disposal in secured land ll or incineration ^{@@}
6	Soiled Waste (Items contaminated with blood and body uids including cotton, dressings, soiled plaster-casts, linen, bedding, other materials contaminated with blood)	Incineration ^{@@}
7	Infectious Solid Waste (Wastes generated from disposable items other than the waste sharps, such as tubing, hand-gloves, saline bottles with IV tubes, catheters, glass, intravenous sets etc.)	Disinfection by chemical treatment [@] or autoclaving or microwaving followed by mutilation or shredding ^{##} and after treatment nal disposal through registered or authorized recyclers
8	Chemical Waste (Chemicals used in production of biological toxins, chemicals used in disinfection, as insecticides etc.)	Chemical treatment [@] and discharge into drains, meeting the norms noti ed under these rules and solids disposal in secured land lls

[@] Chemical treatment using at least 1% hypochlorite solution or any other equivalent chemical reagent. It must be ensured that chemical treatment induces complete disinfection.

^{##} Mutilation/shredding must be such that so as to prevent unauthorized reuse.

^{@@} There will be no chemical pre-treatment before incineration. Chlorinated plastics/bags shall not be incinerated. Disposal of bio-medical waste by deep burial shall be prohibited in towns and cities. Disposal by deep burial is permitted only in rural areas where there is no access to common bio-medical waste treatment facility, with prior approval from the prescribed authority. The deep burial facility shall be located as per provisions and guidelines issued by Central Pollution Control Board from time to time.

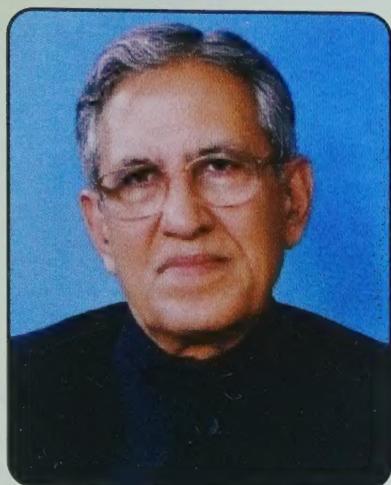
Color coding and type of container for disposal as per Draft Bio-Medical Waste Rules, 2011 (Schedule II)

Color	Type of container to be used	Waste category number	Treatment options as per Schedule
Yellow	Non-chlorinated plastic bags	Category 1, 2, 5, 6	Incineration
Red	Non-chlorinated plastic bags/ puncture-proof containers for sharps	Category 3, 4, 7 Soiled Wastes	As per Schedule I (Rule 7)
Blue	Non-chlorinated plastic bags/ containers	Category 8 (chemical wastes)	As per Schedule I (Rule 7)
Black	Non-chlorinated plastic bags	Municipal waste	Disposal in municipal dump sites



B.L. Joshi

Governor, Uttar Pradesh



Raj Bhawan
Lucknow- 227 132

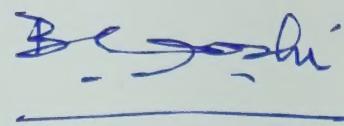
Date : 30 November, 2013

Message

It is great pleasure to know that the Bio-Medical Waste Management Cell, King George's' Medical University, Lucknow is organizing the "13th Annual Conference of Indian Society of Hospital Waste Management" on 7th & 8th December, 2013, preceded by a Workshop on 6th December, 2013 at Scientific Convention Centre.

Management of waste in health care Industry is getting complex as a result of rapid changes taking place in hospital practices. As health care providers it makes mandatory for the health care establishments to ensure such waste is handled scientifically so that there shall be no adverse effect to human health and environment.

I convey my best wishes for the success of the conference.


(B.L. Joshi)



BIO MEDICAL WASTE MANAGEMENT CELL

AKHILESH YADAV



CHIEF MINISTER
UTTAR PRADESH

LAL BAHADUR SHASTRI BHAWAN
LUCKNOW

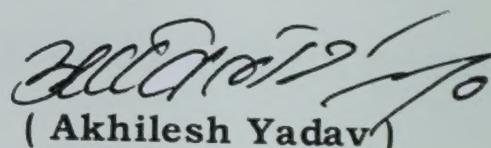
Date : 29 November, 2013

Message

I am happy to know that the Bio-Medical Waste Management Cell, King George's Medical University, Lucknow is organising the 13th Annual Conference of Indian Society of Hospital Waste Management on 7th & 8th December, 2013.

Safe management of health care waste is essential for a clean and healthy environment. It is heartening to note that a National Conference on Bio-medical waste management and disposal is being organised for the first time in our state. I am confident that the deliberations during the Annual Conference would be beneficial for all.

I convey my best wishes for the success of the event.



(Akhilesh Yadav)



ISHWMCON 2013



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Prof. Devendra K. Gupta

MS, M.Ch., FAMS, Hon. FAMS (Rom.), Hon. FCSS
Hon. FRCS (Glas.), Hon. FRCS (Edin.), D.Sc. (H.C.)

Vice-Chancellor

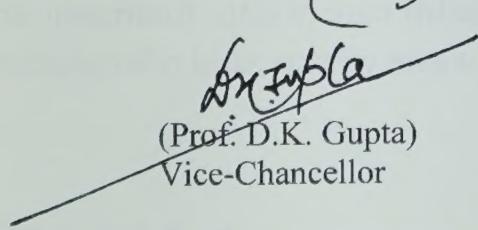


Message

It gives me immense pleasure to know that the Bio-medical Waste Management Cell, King Georges Medical University Lucknow is organizing the “13th Annual Conference of Indian Society of Hospital Waste Management” on 6th, 7th and 8th December 2013.

Hospitals are integral part of the society in maintaining the good health and also Preventing/Diagnosing the various diseases of the people and thus enhance the life term of the human being. Similarly, waste from the hospitals are creating deadlock in the real progress of the health of the people and therefore Hospital Waste Management has become the utmost priority of the society and the Country, Hence, Organizing workshop and conference is the essential part of the awareness program of all the Health Care Establishments.

I congratulate organizing committee members for organizing this conference and wish the Conference grand success.



(Prof. D.K. Gupta)

Vice-Chancellor

President

- World Federation of Associations of Pediatric Surgeons (2014-16)
- Federation of Associations of Pediatric Surgeons from SAARC Countries (2004 - till date)
 - Asian Association of Pediatric Surgeons (2006-08)
 - Indian Association of Pediatric Surgeons (2003-04)





Message

Public interest in emerging and developing countries to improve health services has been growing steadily, and poor waste practices within health-care facilities were being challenged increasingly by interest groups and communities. In the more developed countries, there was a renewed concern about consumption of resources and impacts on global changes to climate and the environment. In many countries, knowledge about the potential for harm from health-care wastes has now become more prominent to governments, medical practitioners and civil society. Increasingly, managers and medical staff are expected to take more responsibility for the wastes they produce from their medical care and related activities. The indiscriminate and erratic handling and disposal of waste within health-care facilities is now widely recognized as a source of avoidable infection, and is synonymous with public perception of poor standards of health care.

The year 1998 can be termed as a landmark year as India came out with its Bio-medical Waste Management Rules-1998. First country to do so in South East Asia. These Rules have been further revised in 2013.

Between 75% and 90% of the waste produced by health-care providers is comparable to domestic waste and usually called "non-hazardous" or "general health-care waste". The remaining 10–25% of health-care waste is regarded as "hazardous" and may pose a variety of environmental and health risks.

It is heartening to note that WHO, SEARO has recently signed an APW (Agreement for Performance of Work) with ISHWM to undertake a multi centric research study spreading over two and half years, on "linkage between hospital associated infections and health care waste". We have already identified hospitals in different parts of the country and started working on this study since October 2013. The tools for the baseline survey have already been drafted.

The ISHWMCON 2013 will dwell on risks associated with health care waste, treatment and disposal methods, health and safety practices for health care personnel & waste workers and related other important issues.

Prof. Ashok K Agarwal
President, ISHWM





किंग जार्ज चिकित्सा विश्वविद्यालय उ०प्र०, लखनऊ- 226003

फोन : 91-0522-2257540 फैक्स : 91-0522-2257539 वेबसाइट : www.kgmcindia.edu.



दिनांक : 2/12/13

संदेश

किंग जार्ज चिकित्सा विश्वविद्यालय सेवा, शिक्षा तथा शोध के क्षेत्र में नित नूतन प्रगति कर रहा है। जैव चिकित्सा अपशिष्ट पदार्थों के प्रबंधन व निस्तारण सम्बन्धी राष्ट्रीय गोष्ठी का आयोजन विश्वविद्यालय के बहुमुखी विकास को एक नया आयाम दे रहा है। राष्ट्रीय व अन्तर्राष्ट्रीय विशेषज्ञों का एक साथ विचार मंथन अपशिष्ट प्रबन्धन के नीति निर्धारण में अति सहायक होगा। अत्यंत हर्ष का विषय है कि विश्वविद्यालय की अपशिष्ट प्रबंधन इकाई एशिया में कुशल प्रबंधन हेतु सर्वोच्च स्थान पाकर सम्मानित हो चुकी है। मैं राष्ट्रीय गोष्ठी की सफलता को लेकर पूर्णतः आश्वस्त हूँ तथा गोष्ठी प्रबंधन के समस्त पदाधिकारियों व कार्यकर्ताओं को हार्दिक शुभकामनाएँ देता हूँ।

योगेश कुमार शुक्ला
कुलसचिव



Dr. K. K. Gupta

M.D (Medicine), D.M. (Endocrinology),
D.N.B. (Endocrinology)

Director General

Medical Education & Training
U.P., Lucknow



D.O. Letter No.

Office : Medical Education & Training,

6th Floor, Jawahar Bhawan, Lucknow (U.P.)

Telephone : 0522-2287653

Date : 21.11.2013

Message

It is a matter of immense pleasure that the Bio-medical Waste Management Cell, King George's Medical University, Lucknow is organizing the "**13th Annual Conference of Indian Society of Hospital Waste Management**" on 7th and 8th December 2013, preceded by a workshop on 6th December 2013 at Scientific Convention Centre.

Management waste in health care Industry is getting complex as a result of rapid changes taking place in hospital practices. As health care providers it makes mandatory for the health care establishments to ensure such waste is handled scientifically so that there shall be no adverse effect to human health and environment.

I congratulate the entire team and leadership on this occasion and wish grand success of this venture and publication of souvenir.

(Prof. K. K. Gupta)



Amit Kumar Ghosh
I.A.S
Mission Director



National Health Mission

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Vishal Complex, 19-A,
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Ph. No. : 0522 - 2237496, 2237522 (DID)
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MESSAGE

I am very happy to know that the 13th Annual conference of the Indian Society of Hospital Waste Management (ISHWMCON – 13) is being organized by the Bio-medical Waste Management Cell at King George's Medical University, Lucknow from 6th -8th December 2013.

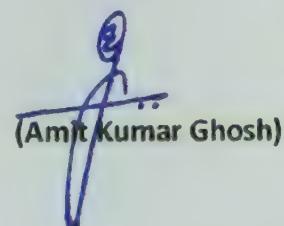
Despite the fact that each healthcare facility and worker is mandated by law to take care of the healthcare waste produced and thus provide healthcare without harm, bio-medical waste management continues to be a neglected and under-emphasized part of healthcare in India. With a rapid increase in the number of healthcare facilities and increasing use of disposables, bio-medical waste so produced and poorly handled poses an immense threat to patients and relatives, healthcare workers, waste management employees, society and environment at large. Moreover, healthcare waste is offensive to the sensibilities as well.

Dealing with this waste effectively and scientifically as per the rules is an ongoing national issue, with very poor compliance in both public and private sector healthcare facilities. The total number of Central Biomedical Waste Treatment Facilities (CBWTF) in the country is approximately 191, of which approx. 15 are located in the State of Uttar Pradesh. On the other hand, there are huge number of public and private hospitals, nursing homes, private clinics and pathologies/diagnostic centers which churn out waste every day. It is estimated that of the total biomedical waste produced in India, less than one third of it is treated as per current guidelines and disposed off safely.

King George's Medical University, despite being a 3000 + bed institution and a tertiary care centre, has put in significant effort in building a affordable and sustainable model of biomedical waste management, that has been working well for the University. I am hopeful that by organizing this conference, they shall be able to showcase this model as an inspiration for other hospitals to adopt.

This conference should be able to increase awareness and bring about a change in attitude among the personnel involved in health care services with regards to biomedical waste management.

I wish the conference all success.



(Amit Kumar Ghosh)



BIO MEDICAL WASTE MANAGEMENT CELL



Message

Dear colleagues in healthcare waste management!

Like many aspects of our lives, the field of healthcare waste management is a dynamic process. This healthcare consultant, while beginning his career in microbiology and infection prevention, moved into the healthcare waste management world 25 years ago. In those 25 years, I have been able to continue to utilize the skills I learned while working in hospital while at the same time expanding my knowledge in healthcare waste management. In that time, I have traveled to over 50 countries to continue to learn and share my experiences with colleagues such as you regarding healthcare waste. Few places have presented as many challenges to healthcare waste management as India. Despite these challenges, one facility I have now spent some significant time with India has demonstrated that success can be achieved. That facility is KGMU. Through hard work and a strong team effort approach, KGMU has demonstrated what is needed to achieve a successful biomedical waste management program in a limited resource setting. The program has also been able to take waste management to new levels in a healthcare setting as in taking place in other institutions around the world. This is taking treated waste and finding outlets for recycling the end product. This is a true application of the waste management hierarchy. Additionally, the team has made great strides to improve the health and safety conditions of waste handlers in the central treatment plant, another success story as well. It has been rewarding during rounds with the waste management team to be well received by all nodal officers in their respective departments. The approach to waste management applied at KGMU are no different than anywhere else in the world: Assessment of the current practices, modification to gaps through training and provision of supplies, provide treatment solution to collected waste, continuous review of procedures to address new gaps that arise.

KGMU has clearly established standard of healthcare waste management that can be emulated by other institutions in India as well as other countries.

Kudos and warm regards to my dear friend and colleague in healthcare waste management at KGMU.

Ed Krisiunas, MT(ASCP), MPH
WNWN International
Burlington, Connecticut USA
29 November 2013





Ashish Kumar Goel

I.A.S.
Project Director



U.P. State AIDS Control Society

A- Block, 4th Floor, PICUP Bhawan, Vibhuti Khand
Gomti Nagar, Lucknow - 226 010

Date : 30 November, 2013

MESSAGE

It is my pleasure to compliment the Bio-Medical Waste Management Cell of King George Medical University for organizing the 13th Annual Conference of Indian Society of Hospital Waste Management on 7-8th December, 2013.

Proper management of waste is very crucial for health care establishments and this cell is among the front runners in the endeavor to ensure that all bio-medical waste is handled scientifically so that there is no adverse effect to human health and environment.

It gives me great pleasure to felicitate the cell on its working towards benefiting the people at large by pursuing the goal of safe hospital environment through its services.

I wish them all the best for all their future endeavors and I convey my best wishes for the success of the conference.

(Ashish Kumar Goel)





BIO MEDICAL WASTE MANAGEMENT CELL

J.P. Sharma
I.A.S.

Principal Secretary



Do.No. 101 /PSME /2013

Tel. :0522-2616648 (O)

Fax No.0522- 2202896

Medical Education Department.

Government of U.P
Room No.306-309 IIIrd Floor
Vikash Bhawan,
U.P. Secretariat,Lucknow
Dated: 21.11.2013

MESSAGE

Dear Dr. Sankhwar

It is a matter of immense pleasure that the Bio-medical Wasre Management Cell, King George Medical University, Lucknow is organizing the "**13th Annual Conference of Indian Society of Hospital Waste Management**" on 7th and 8th December, 2013, preceded by a workshop on 6th December, 2013 at Scientific Convention Centre.

Management of waste in health care Industry is getting complex as a result of rapid changes taking place in hospital practices. As health care providers it makes mandatory for the health care establishments to ensure such waste is handled scientifically so that there shall be no adverse effect to human health and environment.

I convey my best wishes to the organizing committee members for the success of the conference.

(J.P. Sharma)

Principal Secretary

Dr. S.N. Sankhwar

**Organizing Chairperson, ISHWMCON2013
& Chief Medical Superintendent,
KGMU, Lucknow.**



ISHWMCON 2013

**Message**

I wish you, Prof Agarwal and all the members of ISHWM all the success for the ISHWMCON 2013. As a proud member of ISHWM it is indeed a pleasure to see the organization grow and spread across the subcontinent.

It gives me immense happiness to see the event being organized in your esteemed institution-'King George's Medical University', Lucknow. This is just another feather for KGMU, the institution has gained recognition globally for its waste management practices and it's time to showcase the model and spread the good waste management practices across the region.

My sincere thanks to the Vice Chancellor, Registrar, Medical superintendent, all the Hods and nodal officers, specially you and your entire team to have made this happen.



Dr. Megha Rathi
Healthcare Waste Management Consultant
Geneva, Switzerland



Prof. A.A Mahdi
Professor & Head

Vice-President, Society for Free Radical Research - India
Secretary General, Indian Academy of Biomedical Sciences
Organizing Secretary, ICFR-2003, NWPLP-2008, AFRR - 2009, IABS - 2012

Message

I am really very happy to know that the **Bio-Medical Waste Management Cell** of the King George's Medical University, Lucknow is organizing the 13th Annual Conference of the *Indian Society for Hospital Waste Management* on 7th and 8th December 2013 which will be preceded by a Workshop on 6th, December 2013.

Biomedical waste management has emerged as an issue of major concern not only to the hospitals but also to the environment. There is an urgent need for the proper management of biomedical waste as also to create awareness about the hazards of its poor management.

In spite of many constraints, KGMU has developed a very efficient Biomedical Waste Disposal System. I am sure that this meeting will provide an opportunity to share our experiences with others and also to get further updated on the subject.

My heartiest good wishes to the organizing team for the success of this Conference.

(Prof. Abbas Ali Mahdi)
Professor & Head
Department of Biochemistry
& Chief Proctor
KGMU, Lucknow





Phone office : 0522-2256543

GANDHI MEMORIAL & ASSOCIATED HOSPITAL

King George's Medical University, U.P., Lucknow-226003

Prof. S.N. Sankhwar

MS, MCh, PGDHMM

Professor & Head

Chief Medical Superintendent

G.M. & Associated Hospital



Message

It is a matter of great satisfaction and pleasure that the annual conference of the Indian Society of Hospital Waste Management, ISHWMCON-2013, is being organized by Bio-medical Waste Management Cell, King Georges Medical University, UP, Lucknow from 6th-8th December 2013.

King George's Medical University has worked tirelessly and diligently in the area of optimum bio-medical waste management, keeping in mind the basic tenets of being environmentally friendly, eliminating mercury waste and providing healthcare without harm. In the last few years, the University has won many accolades for its efforts and has become a model regional centre for bio-medical waste management.

I am sure that the unique opportunity provided by this conference will be well utilized by all participants, so that they are able to translate this knowledge and know-how in their healthcare facilities and spread these best practices.

I extend my best wishes to all the participants and welcome you to this conference.

(Dr. S.N. Sankhwar)

Professor & Head

Department of Urology

Chief Medical Superintendent

G.M. & A.H.

King George's Medical University,
Lucknow





BIO MEDICAL WASTE MANAGEMENT CELL



OFFICE OF THE DEAN, FACULTY OF MEDICINE

King George's Medical University UP, Lucknow -226003 (India)

अधिष्ठाता कार्यालय, चिकित्सा संकाय

किंग जार्ज चिकित्सा विश्वविद्यालय, उ. प्र., लखनऊ-226003 (भारत)

Ref. : No. 884 / DC / 13

Date : 27-11-2013



Prof. Raj Mehrotra

Message

It's a great pleasure and privilege to be in this auspicious occasion when Bio-medical Waste Management Cell, King Georges Medical University Lucknow is organizing the "13th Annual Conference of Indian Society of Hospital Waste Management" on 7th and 8th December 2013, preceded by a workshop on 6th December 2013 at Scientific Convention Centre.

Biomedical waste Management and Handling is an important adjunct to the successful medical and healthcare. It is our social, moral and legal obligation that we pay attention to each and every aspect of medical waste right from minimization to final disposal. Thus, the solution to the medical waste problem is that of efficient and responsible management through waste minimization, responsible segregation at source, and training of staff at all levels and safe disposal of hazardous biomedical waste.

The present conference will create a platform for exchange of ideas, concepts, current available evidence and sustainable solutions of health care waste management by the experts.

My best wishes & greetings to the Organizing committee members and participants on this occasion.

(Prof. Raj Mehrotra)
Dean

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ISHWMCON 2013



DEAN

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अधिष्ठाता

दंत विज्ञान संकाय,

किंग जॉर्ज चिकित्सा विश्वविद्यालय

उ०प्र० लखनऊ – 226003, भारत

दूरभाष . 0522 2258780



Ref. 1351/13
Date 21/12/13

Message

It gives me immense pleasure to know that the Bio-medical Management Cell, King George's medical University Lucknow is organizing the "**13th Annual Conference of Indian Society of Hospital Waste Management**" on 6th, 7th and 8th December, 2013.

Hospitals are integral part of the society in maintaining the good health and also Preventing/Diagnosing the various diseases of the people and thus enhance the life term of the human being. Similarly, waste from the hospitals are creating deadlock in the real progress of the health of the people and therefore Hospital Waste management has become the utmost priority of the society and the Country, Hence, Organizing workshop and conference is the essential part of the awareness program of all the Health Care Establishments.

I congratulate organizing committee members for organizing this conference and wish the Conference grand success.



(Prof. A.P.Tikku)
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BIO MEDICAL WASTE MANAGEMENT CELL



Bio Medical Waste Management Committee

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Dated :



Message

Management of Bio-medical Waste (BMW) is a neglected and under-emphasized part of healthcare in India, despite there being a formal legislation for the same since 1998. With a rapid increase in the number of healthcare facilities and increasing use of disposables, bio-medical waste is becoming a real threat to the healthcare worker, patient and their relatives, society at large and to the environment. This is against the basic tenet of providing healthcare without harm. As healthcare providers, it is mandatory for the healthcare establishments to ensure such waste is handled scientifically, so that there shall be no adverse effect to human health and environment.

This conference aims to usher in awareness and change in attitude among the personnel involved in health care services. This year, it is the proud privilege of the Bio-medical Waste Management Cell, King George's Medical University, to host the 13th annual conference of ISHWM.

The Organizing Committee has put in sustained effort to ensure the success of this conference with a hands-on experience during the workshop and an interesting and stimulating scientific program, so as to bring about a positive transformation among the delegates that may be translated into day to day practice.

I, along with the members of the Organizing Committee, extend a warm welcome to all the delegates and wish a fruitful, interactive, and enriching experience.

Dr. Kirti Srivastava
Organizing Secretary
ISHWMCON2013 &
Member Secretary, BMW
Management Committee
KGMU U.P., Lucknow





Phone 0522-2257343

UPGRADED DEPARTMENT OF COMMUNITY MEDICINE & PUBLIC HEALTH

King George's Medical University U.P. Lucknow-226003 (India)



उच्चीकृत कम्यूनिटी मेडिसिन एवं पब्लिक हेल्थ विभाग

किंग जार्ज चिकित्सा विश्वविद्यालय उ०प्र०, लखनऊ - २२६००३ (भारत)

Ref. :

Date :



Message

It is indeed a great pleasure to be associated with the 13th Annual Conference of Indian Society of Hospital Waste Management on 6th, 7th & 8th December 2013. This Conference has granted us an opportunity to listen to the discourse of some of the best minds in the field of Healthcare Waste Management in India and abroad. It has been our effort to present the view point of these eminent scientists and clinicians whose endeavors have enriched the management of Healthcare waste.

The enormous input of information and knowledge that has poured in has made it an uphill task to compile them in a handy volume without losing their essence. I must thank the whole Bio-medical Waste management team members and supporting staff for their valuable suggestions in this regard.

I hope this endeavor will prove useful for everyone in the future

(Dr. Reema Kumari)

Editor

Convenor & Joint Organising Secretary
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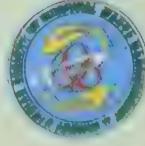
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in Uttar Pradesh**

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2.	M/s Bio Medical Waste Disposal Agency, Vill - pandwa, Raya Neam Gaon Road Mobile No. 9412280833 Mathura
3.	M/s Dutt Enterprises Ltd. (Office)-29, Alkapuri Hirabag, Dayalbag, Agra
4.	Ms. Semb Remky Pvt. Ltd. C-21, M.G Road ind. Area Ghaziabad
5.	M/s Center for Pollution Cofntrol, Mohansarai, Varanasi
6.	M/s MPCC Bijauli, Jhansi
7.	M/s S.N.G Mercantile Pvt. Ltd. Village Benlpur Chaudhary, Bareilly . Mob. : 9411071986
8.	M/s Synergy Waste Management (P) Ltd., Mohammadpur, Nawabganj, Barabanki
9.	M/s MPCC Kanpur CTF 148, eneiamau, emnii, Kanpur. Mob. : 9839111500
10.	M/s Willword Environmental Inc.-Chaudhrypur Mandhana, Kanpur
11.	Ferro Build Hard (india) Pvt. Ltd. 83 -A Maheba Purab Patti. Naini, Allahabad. Mib. : 9415322193
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15.	Ms Envirad Medicare Pvt. Ltd. Parskhera, Bareilly



Invited Articles



AFFORDABLE AND SUSTAINABLE BIOMEDICAL WASTE MANAGEMENT STRATEGIES IN A LARGE TERTIARY CARE HOSPITAL IN A DEVELOPING COUNTRY: COST CONTAINMENT WITH OPTIMAL CARE

Dr. Kirti Srivastava

Member Secretary, Waste Management Committee, King George's Medical University, Lucknow

Introduction : A well-developed sustainable biomedical waste management (BMWM) system is largely non-existent in developing countries. Financial constraints with regards establishment and treatment of BMWM are the most important causes besides lack of awareness and initiative amongst the health care workers. King George's Medical University, a 3000 bedded hospital in North India has pioneered and established a standard and cost-effective model facility for BMWM. The paper addresses the nuances with regards utilization of sterilized waste for revenue generation as well as minimisation of cost involved in overall healthcare waste management.

Methodology: Cost minimization strategies adopted :

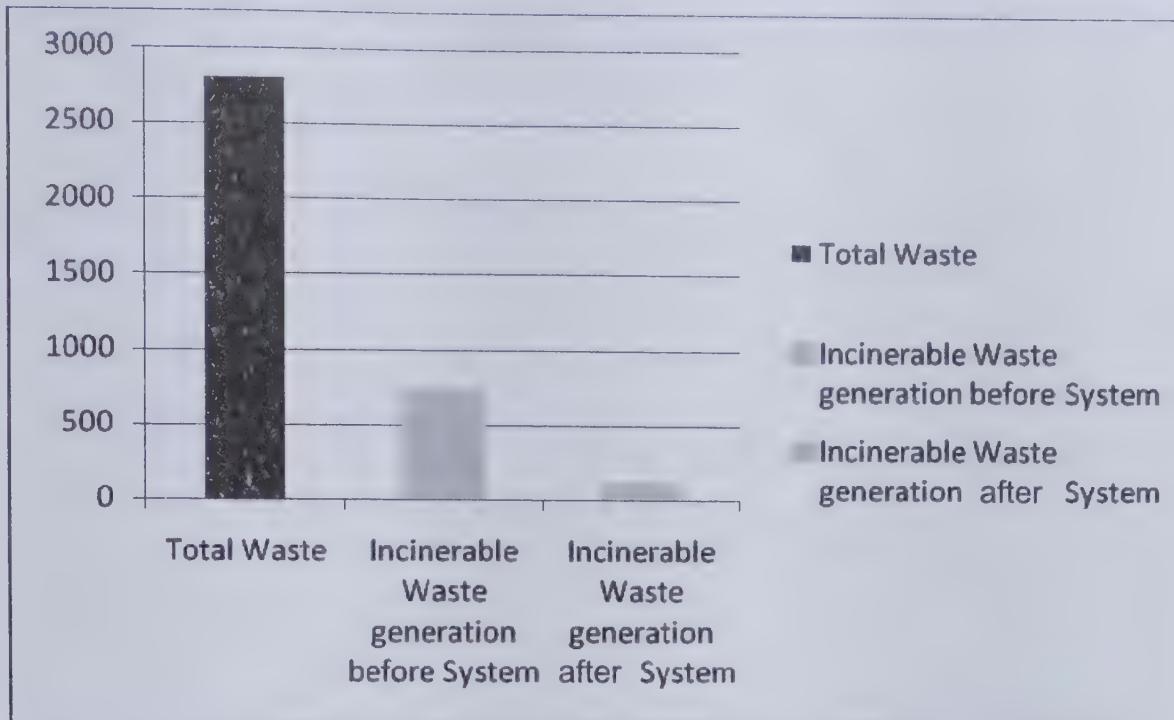
1. Reducing the volume of waste generated;
2. Good waste segregation practices at point of generation; Design of special trolleys.
3. Fuel efficient (green) transportation of waste in healthcare facility;
4. In-house processing and decontamination of recyclable infectious waste by non-burn technologies,
5. Recycling and revenue generation from various categories of waste so generated;
6. Outsourcing for incinerable waste only; minimizing incinerable waste.
7. Municipal solid waste segregated into biodegradable (food & vegetables) waste and plastic waste;
8. Bio composting of degradable municipal waste;
9. Shredding and recycling of paper waste segregated at the source of generation.

Results: Total amount of waste generated in KGMU is approximately 2800 kg/day. By adopting good segregation practices, the segregated waste is distributed as follows:

S.No.	Waste category per month	Income generated per month (Percentage)
1	Glass waste (2900Kg)	5%
2	Plastic waste (4500Kg)	90%
3	Paper waste (650 kg)	3%
4	Food material* (100 kg)	1%

*Under construction





It is evident that by instituting good segregation practices, the percentage of incinerable waste has reduced to 3-4%, which was an important step in achieving cost minimization. The remaining categories of biomedical waste are recycled after autoclaving. Simultaneously recycling of municipal solid waste also contributed to the generation of income.

Conclusions: The model of waste management at KGMU, a large tertiary care hospital in a developing country demonstrates that BMWM can be ideal, affordable and sustainable. Minimization of incinerable waste and revenue generation from segregated, autoclaved plastic waste are important strategies towards this end. These strategies if adopted at other healthcare facilities, can have far-reaching health, financial and environmental consequences. The strategies adopted at KGMU allow the cost incurred for processing of waste to be reduced by upto 60 percent.

King George's Medical University, Lucknow establishes a cost-effective biomedical waste management system. The University, by establishing simple but cost-effective measures for waste management, is generating revenue to sustain the waste management system and aims at reducing the cost of treatment further.

CERTIFICATE COURSE IN HEALTHCARE WASTE MANAGEMENT: AN OVERVIEW

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In these times of heightened environment consciousness, addressing the issue of proper healthcare waste disposal is of paramount concern not only for environmentalists or other members of the health sector but also for the whole of society.¹ The concern for healthcare waste management has been felt globally with the rise in deadly infections such as AIDS, hepatitis and other blood-borne infections.¹ Epidemiological studies show that exposure to pollutants from medical waste incinerators increases the risk of various types of cancers and heart diseases.²



BIO MEDICAL WASTE MANAGEMENT CELL

Healthcare personnel should be fully aware of the need to exercise caution when handling healthcare waste. All personnel should receive appropriate training to develop awareness on the health, safety and environmental issues relating to healthcare waste.³

King George's Medical University, India was selected to be a priority site for the Global Environment Facility (GEF)/Ministry of Environment and Forest (MoEF)/United Nations Development Program (UNDP) Project which was initiated in May 2010.⁴ The GEF-financed MoEF project, supported by the UNDP, seeks to demonstrate the best practices and non-incineration technologies for bio-medical waste management to avoid environmental release of dioxins and mercury. With the establishment of this project, a Certificate Course in Healthcare Waste Management (CHCWM) was seen as important component. The Indira Gandhi National Open University (IGNOU), New Delhi, India in active collaboration with the World Health Organization (WHO) South-East Asia Region, has developed and launched a six-month certificate programme in healthcare waste management through a network of Study Centers all over India⁵ and therefore a Study Center for this Programme is created in the Department of Community Medicine and Public Health, King George's Medical University, Lucknow.⁶ This Certificate Programme has been developed with the objective to equip the learner with the knowledge and skills to manage healthcare waste effectively and safely, and also safeguard the community against the adverse health impact of healthcare waste.⁶ This course is being provided to the doctors, nurses, paramedics, and staff of the institutions who are involved in the Bio-medical Waste Management System.

CHCWM is the distance learning 6-month certificate programme having 8 blocks of self learning material, 6 days of classes (including field visits), teleconferencing sessions including audio and video cassettes, and two assignments and one project report which are mandatory for the course. Theory classes are taken by the experts in the following fields: (a) Fundamentals: understanding our environment, (b) Healthcare waste: definitions, the need for sound healthcare waste management, the current status of healthcare waste management legislation in SEAR countries, and (c) Healthcare waste management: concepts, technologies and the training of practical aspects of health care waste management, systems and technologies in healthcare waste management, healthcare waste management and emerging issues, and the training manual for waste handlers. A participant has to pass an end of term written examination for two papers conducted through IGNOU, along with the assessment of assignments and project work at the study centre. Until now, more than 60 Healthcare Personnel from the institution have been registered for this course and have successfully completed and are contributing actively to the training, monitoring and management of the healthcare waste practices of the hospital.

The Global Project Team of the United Nations Development Programme /GEF, in cooperation with the WHO & Healthcare Without Harm has recognized King George's Medical University, Lucknow, Uttar Pradesh, as a Role Model Hospital for its commitment and dedication to excellence in environmentally sound healthcare waste management practices.^{1,7,8} The project has helped to promote the best practices in healthcare waste management in a hospital and has reduced the amount of infectious waste in the hospital by 80%.⁸ Training in proper segregation, transportation and treatment of bio-medical waste has also helped in reducing the health and environment risks through bio-medical waste.⁸

India has taken many steps over the past few decades to address the pollution caused by healthcare waste. However, only just over 50% of the country's 84,809 hospitals and healthcare facilities properly treat their waste and effectively segregate infected waste from non-infected waste.⁸ The wider implementation of such an innovative program would increase the knowledge, skill and the capacity of the public health workforce to manage hospital waste, and would effectively help to establish a model not only for India, but also for other countries in the region.

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MERCURY TOXICITY WITH SPECIAL EMPHASIS ON NEUROLOGICAL ADVERSE EFFECTS

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Mercury is a known neurotoxicant ,producing substantial morbidity and mortality. It is endangering both public health and environmental cycle. The various pathophysiological mechanism including neurodegeneration are responsible for neurological syndromes.The other body systems which include cardiovascular system,kidney,hematological ,immune and testicular function are adversely affected. Its prudent to curb the emission of mercury for betterment of human population.

Mercury toxicity with special emphasis on Neurological adverse effects

Introduction : Mercury is known to be neurotoxicant for last 100 years. Heavy metals including lead, **mercury, cobalt, cadmium, and chromium affect human health in many ways and cause substantial morbidity and mortality. Mercury is a ubiquitous element and becoming potential hazard for human health and adversely affecting the environment**^[1]. It is universally found element and has great bearing on human health. It is well studied neurotoxicant and prenatal exposure is of prime concern. The exposure to mercury varies with dietary habits, level of contamination and species specificity^[2].

It occurs mainly in 3 forms, elemental mercury, inorganic mercury and organic mercury (methylmercury).The history has observed great disasters of Minamata disease (Japan) and Iraq due to mercury exposure. The pregnant females and young children are quite vulnerable for mercury toxicity. The methylmercury is amplified through aquatic food chain and bioamplify in the fish. The fish eaten in coastal areas is a source of mercury consumption^[3].

In recent past, various regulations have been released by International agencies to decrease the wrath of health hazards posed by mercury exposure. Out of them some methods are phasing out of mercury instruments, ban on unethical practices eg amalgamation in gold mining industry and curtailing herbs containing mercury^[4].

Mechanism of Neurotoxicity : The mercury toxicity mainly occurs in nervous system, renal system, hematopoietic and immunotoxicity. It is a neurotoxin and leads to neurodegeneration. The mercury enters the brain through breach





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in the blood brain barrier and mercury deposits are found throughout the brain. The pathological lesions in Minamata disease are mainly found in calcarine region, pre and post central gyrus and temporal lobes. At neurotransmitter level glutamate mediated neurotoxicity has been established.

The various mechanisms described are free radical generation, mitochondrial dysfunction, effect on enzymes, axonal transport system, oxidative stress, lipid peroxidation, non methylation and underdevelopment of neurons. It causes nephrotoxicity by glomerular damage. The testicular function is affected leading to infertility^[5].

Clinical Manifestations : The various neurological manifestations are -

Ataxia: It occurs due to damage to the cerebellum. The patient manifested with gait unsteadiness, imbalance and unco-ordinated motor movements.

Peripheral Neuropathy : The various symptoms are tingling, paresthesias and unbearable pains in distal extremities.

Cognitive dysfunction: The mercury adversely affects the brain development. The child born to females consuming aquatic fish on coastal areas showed low intelligence. Their mental and physical growth got retarded. The memory and other higher mental functions are hampered.

The other neurological disorders occurring as a consequence of mercury toxicity are diminution in vision, skin manifestations, headache, coma, tremors, dysesthesia, irritability, fatigue, behavioral changes and hallucinations^[6].

Differential diagnosis :

1. Diabetic neuropathy
2. Vitamin B12 Deficiency Neurological Disorders
3. Metabolic ataxia
4. Encephalopathy due to metabolic causes

Diagnosis : The diagnostic approach depends upon type of mercury exposure. The patient should be meticulously clinically examined. The environmental settings should be explored as whether patients are residing in coastal areas, occupational exposures and food habits eg Fish consumption. For assessment of inorganic exposure, urinary mercury measurements are required, for organic mercury exposure blood levels are examined and long term exposure is being assessed by hair examination.

Treatment : The management can be divided into 2 parts.

Non Pharmacological Measures : The aquatic fish consumption should be refrained. People living in coastal areas should be advised not to consume fish in their diet. The mercury instruments used in hospital practices should be replaced by non mercury instruments.

Pharmacological Measures : The chelating agents are sometimes used to chelate the element. Antioxidants, Coenzyme Q and N acetyl cysteine therapy revealed positive results. Experimentally, estradiol has been tried with some convincing results. Organic selenocompounds proved to be potential therapeutic targets to treat Methyl Mercury poisoning.

Can we phase out? : The World regulatory authorities have given notifications to wipe out mercury from the planet. This is because of serious concerns about environmental hazards. Methylmercury has property of Bioamplification which helps in maintaining the toxic metal in the environment.

Future implications : Recently, a study revealed massive monetary benefits in European countries by curbing emissions of methylmercury. It is difficult to completely eliminate mercury as it is recycled in the environment. As





seafood is main part of diet in vast population of the world, complete ban on consumption of sea food is not possible^[11].

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VERMICOMPOSTING: AN ECOFRIENDLY TECHNIQUE FOR ORGANIC PORTION OF HOSPITAL WASTE

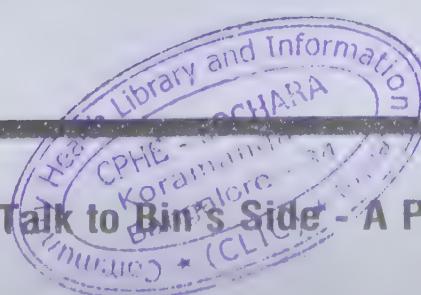
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Health-care waste includes all the waste generated by health-care establishments, research facilities, and laboratories. Between 75% and 90% of the waste produced by health-care providers is non-risk or “general” health-care waste, comparable to domestic waste. It comes mostly from the administrative and housekeeping functions of health-care establishments and may also include waste generated during maintenance of health-care premises. The remaining 10—25% of health-care waste is regarded as hazardous and may create a variety of health risks which needs treatment prior to dispose off. The major part of hospital waste is general waste which can be used by converting it into useful form through Vermicomposting, an eco-friendly technique.

Vermicomposting is the non-thermophilic oxidative decomposition by mutual interaction between earthworms and micro-organisms that converts organic substrates into value-added products. Composting with worms is practiced all over the world. Vermicomposting is one of the most effective waste management techniques that not only reduces volume of waste substrates but also converts them into nutrient-rich humus like organic amendments. Composting and soil-dwelling worms are not the same—they are related species, but they have different roles in nature.

Types of Food Waste to Use: Worms prefer a vegetarian diet, and will consume leafy greens, fruits, vegetables, and coffee grinds quickly. They also need a source of calcium to reproduce. Calcium can be provided through eggshells or a calcium-rich antacid tablet.





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Types of Earthworms to Use: Several species of earthworms can be used in a vermicomposting operation for animal and vegetable wastes. In India, Eisenia fetida, epigeic species is the most commonly used earthworm for composting. Various common names of redworms, brandling worms, manure worms, or compost worms are used because of their appetite. Any worms that are naturally attracted to fresh organic wastes can be used in a vermicomposting system.

Ideal Environmental Conditions for Earthworms: The key to a successful vermicomposting system is to provide the earthworms with an ideal environment for growth. In addition to a food source, earthworms need oxygen, moisture, and moderate digester temperatures. The pH, ammonia, and salt concentrations in the bin are important variables to control and maintain during operation, as well. Earthworms prefer moderate temperatures in the range of 40 to 90 degrees Fahrenheit, and a moisture content of between 70 and 90%.

Factors Responsible for earthworm distribution:

- i) Physico- chemical (Soil, temperature, moisture, pH, inorganic salt, aeration and texture)
- ii) Available food (herbage, leaf litter, dung, consolidated organic matter)
- iii) Reproductive potential and dispersive power of the species.

Fundamentals of Operation: The basic principle of a flow-through vermicomposting operation is to add a mixture of food waste and bulking material in thin layers and allow the earthworms to process successive aerobic layers of wastes. The earthworms will generally be concentrated in the upper six inches of material, and they will move upwards as each successive waste layer is added.

Vermitechnology can be a promising technique that has shown its potential in certain challenging areas like augmentation of food production, waste recycling, management of solid wastes etc. There is no doubt that in India, where on side pollution is increasing due to accumulation of organic wastes and on the other side there is shortage of organic manure, which could increase the fertility and productivity of the land and produce nutritive and safe food. So the scope for vermicomposting is enormous.

STUDY TO DETERMINE PREVALENCE AND CIRCUMSTANCES OF NEEDLE STICK INJURY AMONG HEALTH CARE WORKERS AT A MULTI-SPECIALITY TERTIARY CARE TEACHING HOSPITAL AT, NEW DELHI

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Introduction: Needle Stick Injuries (NSI) are increasing among Health Care Workers (HCWs) due to increased number of intervention procedures with sharps or due to increased reporting. Circumstances leading to the injuries need to be identified and measures to decrease the incidence of NSI should be implemented. Immunization, personal protection, training in correct use of instruments and proper disposal techniques of sharps should be made available to HCWs.





Methodology: A non-participating observation study of 1091 injection procedures was done using a standard check-list from CDC Workbook over a period of 100 hours in 10 different locations of the main hospital and the centres to find out the circumstances that may lead to a NSI. Study was done from October, 2012 till April, 2013. Data of both studies was statistically analyzed for results. Discussion, comparisons and recommendations was done based on the results.

Results of the study: Observation study to determine the circumstances among HCWs showed that the rates of observed circumstances having potential to cause NSI was the highest among Lab Technicians with 68(17.5 %) times out of 389 procedures. In case of Resident Doctors it was 36 (12.2 %) times out of 296 procedures and for Nurses it was 42 (10.4 %) times out of 406 procedures. The Intervention procedure associated with the highest possibility of causing a NSI was phlebotomy at 46.6%. Lab technicians were the group involved with majority of phlebotomy procedures. Lab Technicians were the only group in the observation study where actual NSI was observed in 5 instances. Immunization with 3 doses of Hepatitis B was also the lowest among Lab Technicians at 31.6%.

Conclusion: Area specific work load and ergonomics of work stations were found contributory factors in precipitating circumstances leading to NSI among Lab technicians. Qualification, inadequate job training and lack of awareness on the use of safety devices were other factors. Practice of injury reporting, immunization, use of personal protective equipment and sharps disposal methods among Lab Technicians varied within the Institute. Need for addressing these issues for protection of the HCWs was recommended with suggestions for implementation.

Key Words: Needle Stick Injury, Health Care Worker, Work circumstances.

BIO-RISK ASSESSMENT OF WASTE MANAGEMENT

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The backbone of the practice of bio-safety is risk assessment. While there are many tools available to assist in the assessment of risk for a given procedure , the most important component is professional judgment. Risk assessment should be performed by the individuals most familiar with the specific characteristics of the organisms being considered for use, the equipment and procedure to be employed, standard operating procedure that may be followed, and the containment equipment and facilities available. The Medical Superintendent/In-charge of bio medical waste is responsible for ensuring that adequate and timely risk assessments are performed, and for working closely with the institution's safety committee and bio-safety personnel to ensure that appropriate equipment and facilities are available to support the work being considered. One of the most helpful tools available for performing a hospital risk assessment is the listing of risk groups for infectious agent, injuries and accidents.

Personnel handling infectious waste containing highly infectious agents are at a high risk of contracting waste/laboratory-acquired infection. This risk is particularly high for those working in Bio-medical waste. Injuries through infected needles and sharp cutting instruments encountered in diagnostic procedures represent potential sources of waste-acquired infections. Laboratory-acquired infections involving contagious diseases have also demonstrated the potential to spread beyond the hospital into the general community at large.

Hospitals and diagnostic laboratories are at the forefront of disease detection in India. They are expected to have the capacity to handle and detect known or unknown (novel) biological agents. Although diagnostic laboratories are important in the fight against infectious diseases, laboratory workers & waste handler are generally faced with many occupational risks. Evidence exists that compliance with universal safety precautions reduces the risk of infections and protects health care practitioners. Regular monitoring waste management and assessment of diagnostic laboratories for the presence of bio-safety devices and compliance rate with standard bio-safety measures therefore will not only promote a safer working environment, but could also impact greatly on maintaining qualitative hospital service delivery. At present, very few reports exist on bio-risk assessment of waste management in the country.





BIOMEDICAL WASTE MANAGEMENT IN QUEEN MARRY HOSPITAL- HOW AND WHY

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Biomedical waste means any waste which is generated during the diagnosis, treatment or immunization of human being and research activities pertaining thereto or in the production or testing of biological and including categories mentioned in Schedule 1. (Biomedical waste Management and Handling Rule 1998 of India)

75-90% of the waste generated by the health care providers is non risk or general health care waste, comparable to domestic waste. 10-25% healthy care waste is regarded as Hazardous and may create a variety of health risk. All individual exposed to such hazardous health care waste are potentially at risk including those who generate the waste or those who either handle such waste or exposed to it as a consequence of careless management.

Main group at risk :

Medical doctors, Nurse, Health care auxiliaries' hospital maintenance personnel. Patients in health care establishment visitors to health care establishment. Worker in support service, allied to health care establishment such as laundries, waste handling and transporters.

Waste management in Queen Mary's Hospital :

There are 16 stations where posters are attached displaying the method of segregation along with the color coded bins, yellow, red, black, white, blue and these bins also attached to the trolley to make possible segregation at the point of generation.

Total waste generated at QMH over a period of 8 month 46750kg , out of which general waste is 23246 kg and infectious waste 14851kg, plastic waste 8581kg, sharps waste 34.72kg, glass waste 48.8kg. Large amount of this infectious waste might be due to improper segregation at few places. Maximum waste type is general waste at all sites of QMH so my strong recommendation was to segregate the waste properly and increase the training program to make aware medical and paramedical staff. Over a period of 8 month total 4 needle prick injury were reported.

ABSTRACT

WASTE MANAGEMENT IN QUEEN MARY'S HOSPITAL- HOW & WHY

Prof. Rekha Sachan, Prof. Vineeta Das, Meenakshi Singh

Introduction

Biomedical waste also known as infectious waste or medical waste, is defined as any waste which is generated during the diagnosis, treatment or immunization of human being and in research activity.

Aim: To measure the amount and type of waste generated and to assess the segregation quality.

Material and methods: Retrospective observational study carried out over a period of 8 months at Department of Obstetrics & Gynaecology, KGMU, Lucknow. Information gathered from previous records and data were analyzed. All waste generated over a period of 8 months at 1-16 stations, maximum waste generation sites divided into 4 sites, waste segregated and different types of waste at each station calculated.

Results: Total waste generated at QMH over a period of 8 month, 46750kg , out of which general waste is 23246 kg and infectious waste 14851kg, plastic waste 8581kg, sharps waste 34.72kg, glass waste 48.8kg. Maximum waste generating site was operation theater followed by ward & labour room.

Conclusion:

Total waste generated over a period of 8 month 46750kg. At all sites maximum amount of waste type was general waste. Infectious waste was 14851kg, this large amount of infectious waste might be due to improper segregation at few places. So recommendation is that to segregate waste properly and improve the awareness among medical and paramedical staffs



Abstracts of oral Presentations



BIO MEDICAL WASTE MANAGEMENT CELL

BIOMEDICAL WASTE DEMANDS SPECIAL AWARENESS: A FORTHRIGHT ASSESSMENT AMONGST THE CITIZENS OF AHMEDABAD, VADODARA AND SURAT

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Introduction : The appropriate handling and disposal of Bio medical waste (BMW) is very important. Pre defined set of rules and regulations are followed worldwide while handling BMW. Due to its multidimensional and complex nature disposal method to be followed; bio medical waste is a matter of "Prime Concern".

Methodology : The study was conducted in the cities of Ahmedabad, Surat and Vadodara in Gujarat State. This study was carried out between the month of August and September 2013. 100 citizens randomly from different fields were selected from each city. The tool used for collection of data was a set of questionnaire to access the general awareness about biomedical waste.

Results : It was disappointing to observe that the citizens lack knowledge on biomedical waste and its management. Knowledge regarding the seriousness of the issue and existence of rules by government is found to be better among the citizens. Regarding practices related to segregation, colour coding, disposal, etc. of biomedical waste management, most of the citizens were not conversant on all the counts.

Discussion : Effective management of biomedical waste is not only a legal necessity but also a social responsibility. Management of Biomedical Waste is not just the responsibility of the hospital staff, local authorities and government, but it is duty of every individual. The findings will help us to address the issue more appropriately and plan for better awareness and community participation programs.

Conclusion : Appropriate awareness and community training programs regarding biomedical waste management needs to be given emphasis; lack of proper and complete knowledge pertaining to biomedical waste management poses a serious threat not only on human being but on the environment as well.

Keywords: Biomedical, Hospital, Waste, Citizen

BIOMEDICAL WASTE MANAGEMENT SYSTEM IN A TERTIARY CARE HOSPITAL

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INTRODUCTION : Biomedical waste management has recently emerged as an issue of major concern not only to hospitals but also to the environment. Hospital waste is a potential health hazard to the health care workers. The problems of the waste disposal in the hospitals and other health-care institutions have become issues of increasing concern.





METHODOLOGY : Samples (urine, pus, blood, stool etc.) which were collected from various clinical wards and settings were sent to Department of Microbiology, ELMC & H. After performing relevant tests, used containers can be classified into two categories :-

- 1) Reusable.
- 2) Disposable.

Reusable categories were treated with various methods such as Autoclave, Chemical method etc. so that the materials can be safely used.

Disposable items were properly disinfected before disposal so as not to cause any harm.

RESULTS : ELMC & H generates approximately 1.21Kgs waste per bed per day and maximum waste is generated in wards. The institute has got separate colour-coded bins in each ward for collection of waste.

DISCUSSION : Medical wastes should be classified according to their source, typology and risk factors associated with their handling, storage and ultimate disposal. The separation of waste at source is the key step and reduction, reuse and recycling should be considered in proper perspectives.

CONCLUSION : There is need to consider innovative measures to clean up the distressing picture of the hospital. Proper segregation and collection practices of bio-medical waste still need some more improvement in the hospital.

KEY- WORDS: Biomedical waste, Category, Re-usable, Disposable

CURRENT BIOMEDICAL WASTE MANAGEMENT PRACTICES AND CROSS-INFECTION CONTROL PROCEDURES OF DENTISTS IN INDIA.

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OBJECTIVES: To investigate the knowledge, attitudes and behaviour of dentists working in dental clinics and dental hospitals regarding biomedical waste management and cross-infection control.

METHODS: A national survey was conducted. Self-administered questionnaires were sent to 800 dentists across India.

RESULTS: A total of 494 dentists responded, giving a response rate of 61.8%. Of these, 228 of 323 (70.6%) general dentists reported using boiling water as a sterilising medium and 339 (68.6%) dentists reported disposing of hazardous waste such as syringes, blades and ampoules in dustbins and emptying these into municipal corporation bins.

CONCLUSIONS: Dentists should undergo continuing education programmes on biomedical waste management and infection control guidelines. Greater cooperation between dental clinics and hospitals and pollution control boards is needed to ensure the proper handling and disposal of biomedical waste.





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BIOMEDICAL WASTE MANAGEMENT IN DENTAL PRACTICES OR DENTAL HOSPITALS

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Health care waste management in Dentistry is a blissfully ignored subject in our country, although the government of India under the provision of the Environment protection Act, 1986 notified Biomedical Waste (management & handling) rules on 20th July 1998 (BMW 1998).

A lot of biomedical waste is generated in dental practices, which can be hazardous to the environment as well as to those who come in contact with the materials, if not dealt with appropriately. Most of the rules world- wide are not specific for dental BMW management and are difficult to easy understanding by dental practitioners. Because of lack of clear-cut guide lines either from Dental Council of India or Government of India or Indian Dental Association (IDA) on disposal of Dental wastes. We developed and implemented a simplified waste segregation protocol for practicing dentists and dental hospitals. A systematic dental waste segregation protocol was required to consider its disposal and ill effects on health and environment.

Dental health care wastes are materials that have been generated in dental establishments (which includes dental clinics, hospitals & dental institutions) which are of no longer required for use and should be discarded. Health care service units generate waste that can be classified into: general non hazardous waste, sharps, infected waste (not containing sharps), chemicals & pharmaceuticals waste and other hazardous waste. As health care providers, dental professionals have an ethical & social responsibility towards the management of such waste generated. As per the precautionary principles Basel convention that states, " when an activity raises threats of harm to the environment or to human health, precautionary measures should be taken even if some cause and relationships are not fully established scientifically".

HOSPITAL WASTE WATER MANAGEMENT "Let the waste of sick not contaminate the lives of healthy"

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Hospitals and dental offices are significant consumer of water and generate considerable amount of waste water which consist of drained blood, pathogen and harmful bacteria, virus, pharmaceuticals & its metabolite, radioactive elements, toxic chemical, heavy metals .which adversely affect the environment human being by causing various diseases & can pollute the water bodies in which they ultimately drain.so, it is the need to manage this waste which can be done by source reduction by various means or segregation; by recycle & reuse &also by treatment disposal.Treatment can be done by Effluent treatment plant (ETP) at primary, secondary & tertiary level sludge obtained can be used as a fertilizer.Waste water is not only a threat but a challenge where we can find opportunities for creating social well being & ecological health also.





KNOWLEDGE, ATTITUDE AND PRACTICE STUDY ON HOSPITAL WASTE MANAGEMENT AMONG RAILWAY PARAMEDICAL STAFF

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Introduction: The wastes generated from healthcare establishments pose serious threat to the environment and the people associated with it. Safe and sustainable hospital waste management (HWM) is not possible without favourable knowledge, attitude and practices among health care providers. Study was aimed to assess KAP status in view of strengthening HWM services.

Methodology: Present study was conducted among 100 paramedical staff (nurses, pharmacist and lab. technicians) working in railway hospitals at RDSO, NE, Northern Zones at Lucknow and Gonda through questionnaire.

Results: Overall knowledge was found best in nurses followed by technicians and pharmacists. All staff had correct knowledge of sources of biomedical waste, symbols and different colour coding used in practice and major associated risks. Attitude of staff with respect to HWM varies between 63.3-93%. All hospital has health management plans and waste management team, disposal in appropriate colour coded bins but only 44% staff confessed to have undergone any kind of training for HWM.

Discussion: Findings are in conformity with previous studies emphasizing that healthcare workers at all levels need to be trained and informed to be able to practice HWM procedures.

Conclusion: Overall KAP status among pharmacist category is unsatisfactory requiring urgent training programmes. Although nurses and technicians have satisfactory knowledge, their attitudes and practice behaviours need further strengthening by professional development programmes.

Keywords: hospital waste management, knowledge attitude and practice, paramedical staff.

WEALTH FROM SOLID WASTES - AN EFFORT AT TERTIARY CARE HOSPITAL OF INDIA

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Introduction - In India, the average production of hospital waste is 1.5kg./bed/day, out of which 20% is biomedical (hazardous) in nature. Cost benefit measures of hospital waste, specially the biomedical, are not practiced, therefore emphasis can be given on cost containment/cost effectiveness. Domestic waste such as cardboard, paper, container, glass bottles and a part of biomedical waste such as plastic materials and other rubber materials can be utilized by recycling after disinfection/sterilization to recover some revenue out of it or to bring down the





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cost of treatment. Sanjay Gandhi Post Graduate Institute of Medical Sciences (SGPGIMS), Lucknow U.P. India, a 886 bedded, tertiary care institute, is practicing the methods of waste utilization/recycling, wealth generation from solid waste and cost containment in treatment.

Objective: This study was intended with an objective to analyze the outcome of measures adopted for hospital solid waste utilization/recycling, in term of wealth / revenue generation and waste / treatment cost reduction.

Methodology: A Retrospective study was carried out in the month of April 2013 and data related to selling of solid waste including some of the biomedical waste (after disinfection/sterilization) and recycling of waste, for the last 03-06 years was collected and analyzed.

Findings: It was observed that the hospital earned INR. 6.23 million (USD. 113438.00) during last 63 months (Jan. 2008 to March. 2013) by selling the recycled hospital solid waste materials such as disinfected/sterile plastic/latex materials, card board, glass bottles etc. So far as cost containment in medical care is concerned, the hospital sterilized/ recycled and used the plastic/rubber consumable in patient care of worth of INR 137.20 million (USD 2.85 million) during last 06 years.

Conclusion: The outcome is highly satisfactory in terms of containment in treatment cost of patients and wealth generation from solid waste which is being used for maintenance, up gradation of waste management facilities and others.

Recommendation: Solid waste utilization /recycling practices after proper treatment for cost containment in waste management/ patient treatment /cost recovery, should be adopted by other large hospitals specially tertiary care where the treatment cost is very high and bulk of solid waste is generated.

Key words: Solid waste, cost containment, wealth generation, recycling, sterilization.

PRACTICES AND KNOWLEDGE AMONG DENTISTS FOR HAZARDOUS WASTE MANAGEMENT

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Introduction: This study was aimed to determine the knowledge of dental professionals in India regarding the management of hazardous dental waste and actual practices followed by them.

Methodology: A descriptive cross sectional study was conducted as a survey of Indian dental professionals. A self administered questionnaire was designed to determine the knowledge and practices on hazardous dental waste and knowledge and practice of safety measures against cross-infection. This questionnaire was e-mailed to the seven hundred fifty dentists randomly selected from list of Indian dental association.

Result: Overall response rate was 67.92% (n=494). Obtained response for each question from participated dentist was calculated in percentage. Calculated data showed that there was very high discrepancy between knowledge and practice of dental professionals regarding hazardous waste management. Majority of dentists practice improper waste disposal.

Discussion & conclusion: Regular monitoring and training is required at all levels for proper management of hazardous waste. There is need to retrain the practitioners on the importance and new technologies of proper waste disposal.



ASSESSMENT OF BIO-MEDICAL WASTE MANAGEMENT PRACTICES IN TERTIARY CARE TEACHING HOSPITAL IN DELHI

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Introduction: Biomedical waste collection and proper disposal has become a serious problem for health care institutions and concern of hospital managers. Good "Hospital Waste Management" practices helps to reduce and control the hospital acquired infections. Present study was undertaken in tertiary care teaching hospital with objective to assess current practices of bio-medical waste management including generation, collection, transportation, treatment and disposal technologies in selected tertiary hospital of Delhi.

Material and Methods: The information/data regarding bio-medical waste management practices was collected from key stakeholders using semi structured interview schedule and observation checklist. The information collected was verified by personal observations of waste management practices in hospital.

Result: Biomedical Waste Management Committee is in place and final treatment of biomedical waste is outsourced to synergy waste management private limited. In-house transportation of waste is also outsourced to private organization. Color coded bags (all non chlorine, bio degradable) and trolleys (yellow, blue and black) are used by the hospital for collection of waste. Bags sent from the department are labelled with details of the category of waste, ward number, date of generation duly signed by the sister on duty. Waste from the wards is transported out within 48 hours of collection. However few containers without lid can be observed in wards and intensive care units. Weighing of waste is not done department & ward wise. No register for any adverse event due to hospital waste is maintained in the hospital. Records revealed that no regular training of waste handlers and health care providers is conducted in the hospital.

Conclusion: It is concluded that there should be strict implementation of a hospital waste management policy in the hospital. Trainings and motivation about waste management must be given paramount importance to meet the current needs and standard of bio-medical waste management in tertiary level hospital.

Key words: Hospital waste, teaching hospital, health care providers.

INCIDENCE OF NEEDLESTICK INJURIES AND THEIR ASSOCIATION WITH HEPATITIS B INFECTED HEALTH CARE WORKERS IN A TERTIARY CARE CENTRE

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Introduction: The health care worker HCW is at substantial risk of acquiring bloodborne pathogen infections through exposure to blood or infectious body fluids. Hepatitis B vaccination of HCWs and optimal HCW practices regarding management of sharps can minimize these risks. This study explores the incidence of needlestick injuries in Hepatitis B infected HCWs.



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Methodology: HBsAg ELISA (ErbaLISA) was done from 150 HCWs involved in Hospital laboratory services and different wards of ELMC&H. History of exposure to needlestick injuries, vaccination status, and socioeconomic data were collected.

Results: Of 150 HCWs, 30% were positive for HBsAg. Amongst those, 2% were exposed to needlestick injury. The most common behavior associated with needlestick injuries was 2-handed recapping. Overall, 69% of HCWs disposed of needles unsafely in nonpuncture-proof containers. Overall 22% of HCWs reported receiving 3 doses of hepatitis B vaccine.

Discussion: Distribution of percutaneous injuries according to the location of their occurrence clarified that patient room/ward was the most common place followed by casualty, intensive and critical care units. Nurses were mostly encountered and hands were the most affected body parts.

Conclusion: High rates of needlestick injuries and low vaccination coverage can contribute to high rates of viral hepatitis infections among HCWs. Prevention should be based on different working lines including immunization, education of health care workers and proper knowledge and practices of biomedical waste management.

Keywords: Healthcare workers, Needlestick injury, Vaccination

KNOWLEDGE, ATTITUDE AND PRACTICES OF BIO-MEDICAL WASTE MANAGEMENT AMONGST PERSONNEL OF INSTITUTIONAL TRAUMA CENTER LEVEL II

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Introduction: Today about one fourth of biomedical waste is considered as hazardous and may affect the health of both medical personnel and general community. As medical students are going to be one of the important components of health care system, they should have proper and sufficient knowledge on biomedical waste management. So awareness about various aspects of biomedical waste management has to be assessed frequently.

Objective: To know the existing awareness and knowledge about biomedical waste management among medical students of a tertiary care hospital, K.G.M.U. Lucknow.

Material and Methods: Cross-sectional study was done in 127 students of 7th semester from K.G.M.U. Lucknow by pre-designed questionnaire. The responses were analyzed using epi info software 3.5.1 version.

Results: Majority (74.8%) of the students are between 21-22 years. 114(89.8%) students are not aware of BMW legislation. It was found that knowledge regarding handling and safe disposal biomedical waste management among 54(42.5%) medical students was inadequate. Majority have deficit in knowledge and awareness regarding categories of bio medical waste (73.2%) and its disposal in colour bags (71.3%).

Conclusions: Frequent awareness campaigns and classes may be conducted to improve the knowledge about safe handling and disposal of bio medical waste among medical students for future practical application.

Key words: Awareness, Biomedical waste, health care waste, Medical students.





PREVENTION OF HOSPITAL ACQUIRED INFECTION AND PATIENT SAFETY IN DENTAL CLINICS BY HEALTH CARE WASTE MANAGEMENT: AN OBSERVATIONAL STUDY IN LUCKNOW INDIA

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Healthcare is one of the fastest rising sectors in India undergoing rapid transition. The wastes generated from healthcare establishments pose serious threat to the environment and the people associated with it such as healthcare professionals, workers, subject as well as the general community. Purpose of study was to highlight the preventive measure to control the hospital acquired infection (HAI) in Dental hospital with the help of Health care waste management. The study was conducted through questionnaire, surveys, and interviews with the hospital administration, doctors, nurses, technicians and other personnel involved in the management of generated wastes. Observation techniques were also used to verify the authenticity of the information given by the respondents. The result of this study recommend that we have to improve the training programme for sterilization and should more emphasis in the training of health care waste management for the dental health professional for the controlling of acquired infection and health hazards.

POSTEXPOSURE PROPHYLAXIS FOR HIV

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PEP has been standard procedure since 1996 for health care worker exposed to HIV. Post exposure prophylaxis means disease prevention by taking antiretroviral medications as soon as possible after exposure to HIV so that exposure will not result in HIV infection. These medication are only available with prescription. PEP should begin as soon as possible after exposure to HIV but certainly within 72 hrs. Treatment with 2 or 3 antiretroviral drugs should continue for 4 weeks if tolerated.

In 2005 centre for disease control reviewed information on PEP. PEP should not be used for nonoccupational exposure. Despite these concerns there is growing interest in PEP for nonoccupational exposure. PEP can be given to HBV, HCV, HIV. Usually exposure is from needle prick when health care worker accidentally get jabbed with needle from workplace exposure by 79%.

Other exposure: infant can be exposed if they drink breast milk from infected women.





BEST MANAGEMENT PRACTISES FOR DENTAL WASTE WATER MANAGEMENT- ASSESSMENT OF KNOWLEDGE AND ATTITUDES OF DENTAL PROFESSIONALS

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The waste generated from a dental office is a heterogeneous mixture of particles (dental amalgam, dentine, enamel, oral tissues, pulp, bacteria, etc.) and liquids (water, oral fluids, blood and saliva plasma, surfactants, mouthwash fluids, etc.). Dental waste water (DWW) is the portion of the generated dental waste mixture which enters the disposal and suction lines. A concern over wastewater discharged from dental offices is its potential contamination with mercury and also other heavy metals such as lead, chromium, beryllium and nickel, etc. Besides heavy metal waste, large amount of chemical waste in the form of X-ray photochemicals, cleaners, disinfectants and sterilants may also fall in the category of hazardous waste that cannot be disposed in the waste water stream.

The best management practises employed or known by the dental professionals can therefore, help in reducing the total waste burden in the waste water stream. The present study was planned to assess this knowledge of the dental professionals and contribute in the future planning of dental waste water management.

ASSESSMENT OF BIOMEDICAL WASTE MANAGEMENT IN VARIOUS HEALTH FACILITIES OF DISTRICT GHAZIPUR, LUCKNOW(UTTAR PRADESH)

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Biomedical waste management is receiving greater attention due to recent regulations of the Biomedical Wastes (Management & Handling Rules, 1998). Inadequate management of biomedical waste can be associated with risks to healthcare workers, patients, communities and their environment. An observational study was conducted to assess the method of the handling, treatment and disposal methods of biomedical waste in different health-care settings in district Ghazipur, Lucknow, uttar Pradesh for a period of 3 months from September'09 to November'09. The study covered 4 —private and 6- public health care facilities. A self designed questionnaire was used for the assessment of waste management and informal discussions with various hospital functionaries were carried out for the same. The study identified shortcomings in the existing system. It was observed that waste management has not been given due priority and there was no regular administrative monitoring in the healthcare facilities. Neither of these healthcare facilities followed the recommendations made in biomedical waste management and handling rule 1998. Thus there is an urgent need to look into biomedical waste management practices in the various healthcare facilities. Organizing structured training programs, improvement in cleanliness standards coupled with strict enforcement of laws will go a long way in improving the overall biomedical waste management scenario in the healthcare establishments.





INFECTION PREVENTION AND CONTROL IN THE DENTAL OFFICE, 'Spread the word, Not the Germs!'

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Infection prevention and control is an important part of safe patient care.

The risk of infectious disease transmission is an inherent part of dental practice.

Concerns about the possible spread of blood-borne diseases, and the impact of emerging, highly contagious respiratory and other illnesses, require practitioners to establish, evaluate, continually update and monitor their infection prevention and control strategies and protocols.

Fortunately, such risks can be greatly reduced by practices which include the use of various measures, including administrative, engineering, and work practice controls. Such measures should be codified in an office infection control plan, which should form the basis for the daily infection control activities of the staff.

This review paper discusses the measures that should be taken to safeguard the health of dental healthcare workers and patients and the dentists themselves.

AWARENESS OF BIOMEDICAL WASTE MANAGEMENT AMONG HEALTHCARE WORKERS IN ERA'S LUCKNOW MEDICAL COLLEGE AND HOSPITAL

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Introduction: The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences and a significant impact on the environment as well. The objective was to assess the awareness of biomedical waste management among doctors, nurses, laboratory technicians, and sanitary staff.

Methodology: This cross-sectional study was conducted in Era's Lucknow Medical college and Hospital in 1 year. A total of 312 healthcare workers consented for questionnaire (94% response rate) including 80 doctors, 76 nurses, 72 laboratory technicians, and 84 sanitary staff observed for biomedical waste management practices. Pretested questionnaires on bio-medical waste management were used.

Results: Doctors, nurses and laboratory technicians have better knowledge than sanitary staff regarding biomedical waste management. Awareness regarding the colour coding and waste segregation was found to be better among nurses and laboratory staff as compared to doctors. Regarding practices related to biomedical waste management, sanitary staff were ignorant on all the counts.





BIO MEDICAL WASTE MANAGEMENT CELL

Discussion: Awareness among sanitary staff is low due to poor training facilities and low educational level. Training of both the technical staff and the nontechnical staff is critical for the proper and appropriate management of biomedical waste.

Conclusion: We recommend that strict supervision and surveillance be followed in day-to-day hospital waste management activities. The importance of training regarding biomedical waste management needs emphasis.

Keywords: Biomedical waste management, hospital, training.

AWARENESS OF BIOMEDICAL WASTE MANAGEMENT SYSTEM IN PATIENT'S ATTENDANTS IN INTENSIVE CARE UNITS

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Introduction: Biomedical waste generated from medical activities represent a real problem of living nature and human world. Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment.

Methodology: The study was conducted at a tertiary care center on patients attendants (n=60) in Intensive care units .A training session on Biomedical waste management was undertaken by an expert group comprising of administrative supervisors and doctors. Evaluation of subjects was done by taking written tests before and after the training program.

Results: Out of 35 questions, minimum and maximum marks obtained by the attendants before training was 16 and 28 respectively. Post training marks were 22 and 31 respectively. The difference in marks obtained before training and after training was statistically significant. There was definite improvement in the knowledge on biomedical waste management in attendants after the training session .

Discussion : Proper handling, treatment and disposal of biomedical wastes are important elements of health care infection control program. Further action to ensure proper biomedical waste management should be conducted by the Hospitals according to the Biomedical Waste management Handling Rules & Regulations, 1998 under the Environment protection Act for hospital waste disposal.

Conclusions: Guiding attendants regarding biomedical waste will help to protect patients , other attendants ,health care workers, and the local community from Hospital acquired infections. If properly designed and applied, waste management can be a relatively efficient compliance-related practice.

Key words: Health care, Biomedical waste, Training



SAFER DISPOSAL OF SOLID BIOMEDICAL WASTE

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Solid waste management is a vital issue to reduce, manage, segregate, dispose off properly and it involves more management, skills, and techniques when it is being involved in so many types of infected waste materials.

The safety and acceptability of many widely used health care waste management practices are of serious concern from public health point of view. Disposal methods, including terrestrial dumping, uncontrolled burning & dumping of hospital waste specially in landfills, remain a prominent means of disposal and many landfills remain primitive in their operation.

An innovative technology using PLASMA PYROLYSIS for treating hospital waste is suggested in this paper with its proposed benefits and appropriateness.

STUDY ON NEEDLE STICK INJURIES IN HEALTH CARE WORKERS AT A TERTIARY CARE HOSPITAL AT LUCKNOW

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Introduction : Health care workers (HCW) worldwide are especially exposed to injury by sharp instruments in the course of their duty. Exposures to sharp injuries and their consequences are highly preventable through simple interventions.

Materials and Methods : A study was conducted on needle stick injuries (NSI) at a tertiary care hospital in a period of 6 months. Performa was designed and HCW exposed to NSI were interviewed and data was analysed.

Result : Out of total HCW exposed to NSI 73.33% were females and all were in the age group of 20 to 30 years. Maximum number of ward nurses were exposed to NSI followed by ward attendants. Of the total NSI 66.66% of HCW were not vaccinated for Hepatitis B. 13.33% had incomplete vaccination. 53.33% had not done the anti HBs level in the past. 80% of the cases had known sources of contact, one source was HIV positive and one Hepatitis B positive. 53.33% had contact with blood. 60% of injury was of deep percutaneous type 33.33% was superficial percutaneous and one was mucosal. 20% were due to recapping of the used needle. 26.66% were due to handling of garbage bag. 13.33% were due to subcutaneous injections. 20% due to iv access and rest by other sources.

Discussion and Conclusion : Needle stick and sharp object injuries represent a major occupational challenge to HCW. Prevention should be based on different working lines including immunization, education of HCW and proper engineering control measures.

Key words : HCW- Health care workers, NSI- Needle stick injury



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ZERO WASTE CONCEPT KEY TO OUR FUTURE & MEETING THE NEEDS OF 21st CENTURY AND BEYOND

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"Although unheard of a decade ago, there is considerable recent interest in designing industrial production processes that produce zero waste...the goal is a worthy motivator."

Zero waste suggests that the entire concept of waste should be eliminated. Instead, waste should be thought of as a "residual product" or simply a "potential resource" to counter our basic acceptance of waste as a normal course of events.

Zero Waste strategies consider the entire life-cycle of our products, processes and systems in the context of a comprehensive systems understanding of our interactions with nature and search for inefficiencies at all stages.

A Zero Waste strategy is a sound business tool that, provides an easy to understand stretch goal that can lead to innovative ways to identify, prevent and reduce wastes of all kinds. A Zero Waste strategy may be applied to businesses, communities, industrial sectors, schools and homes.

Because of its visionary endpoint, Zero Waste strategies lead to breakthrough improvements as opposed to small step-by-step actions. This not only results in significant cost savings, greater competitiveness and reduced environmental impacts, but also will move us more quickly toward sustainability.

"If you are not for Zero waste.....how much waste are you far?

PHOENIX.....AN INSPIRATION FOR THE DENTAL PROFESSIONALS

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Dentistry is not the first word that springs to mind when one hears the word "eco-friendly." Our aim is to make his practice as environmentally friendly as possible. eco-consciousness is becoming a new trend and many dental professionals are looking for ways to use recyclable products, it would be easy to brush off eco-friendly dentistry as yet another attempt to get in on the "green" trend. Our aim is to remove the fears and present new field opportunities which we have never thought about. By sharing his journey, we are hoping to start meaningful discussions with dental professionals on environmental responsibility and action. The field of recycling and reusing is extremely interesting and profitable as the raw material is extremely cheap. Recycling is a remake and reuse of waste materials for their previous or new purpose, in one or another way.





MYTHS & MYSTERIES ON MERCURY

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Silver amalgam has been in use as a restorative material since the beginning of the nineteenth century. Unlike any other plastic dental filling material, it has been in continuous clinical use for more than 160 years. Yet the safety of dental amalgam for both the dental patient and the dental personnel has been questioned intermittently since the inception of the use of this material. The controversy relates to the important component of the dental amalgam, that is, mercury.

Half of all dental amalgam is comprised of mercury. Waste amalgam is created when new fillings are inserted and/or old fillings are removed. When material containing mercury is washed down the drain or thrown into the trash, mercury can be released into our air and water and can pose a threat to our health. One important way to help reduce mercury pollution is to use non-mercury products or products with reduced mercury content where possible. Another is to recycle mercury-containing products at the end of their useful lives. The National Health and Medical Research Council's 'Recommendations in Dental Mercury Hygiene' should be followed to reduce occupational and patient exposure to mercury in dental practices from amalgam waste. All public dental clinics should be equipped with specialist systems to trap waste amalgam to control the distribution into the general environment & measures should be taken to minimize the discharge of mercury into the environment.

INFECTION CONTROL IN PROSTHETIC DENTISTRY- A REVIEW

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In the prosthetic dentistry the operating dentist as well as the technician are at an added risk of transmission because of the infection spreading through the contaminated lab equipments and materials, while working in the lab. Infection control is an important concept in the present day practice of dentistry and laboratory procedure so the strict protocols should be followed along with the clinical protocols.

Dentistry is predominantly a field of surgery, involving exposure to blood and other potentially infectious materials and therefore, requires a high standard of Infection Control and Safety. Many countries in the world have strong guidelines and recommendations for dental safety. In a country like India, the concept is new and needs to be advocated on the highest priority. Infection control is important in dental practice to control patient-to-patient infectious disease transmission, and occupational exposure of dental health care personnel (DHCP) to infectious, chemical and other hazards present/encountered during the practice of dentistry. To avoid disease transmission it is important to understand the mechanism of transmission of infection, the pathogens involved and the Safety measures that can be undertaken.





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COOKING THE WASTE

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Disposal of biomedical waste is a continuing problem for small hospitals and clinics especially in the poor developing countries who cannot afford expensive equipments needed such as incinerators, microwave or autoclave.

So solar heating is considered as an alternative technology for the purpose of disinfection.

Solar-box cooker are used commercially for this purpose. In their simplest form consist of two foil-covered boxes (one fits inside the other) with a sheet of transparent glass or plastic as a lid. The material to be heated is placed in a dark container inside the central heating-space and the box is positioned in full sunshine. Heat is generated by an accelerated green house effect. With even the simplest design, maximum temperatures of 100–150°C can be reached depending on the fluid content of the material being heated. Heating water to 65°C in a solar cooker provides enough heat to pasteurise the water and kill disease-causing microbes. Enteroviruses, rotaviruses, *Salmonellaspp*, *Vibrio cholerae*, *Entamoeba spp*, *Histolytica* and *Giardia* cysts, and *ascaris* eggs can be completely destroyed if maintained at temperatures over 62°C for 6 min. Gram-positive bacterial spores in hospital waste may be more resistant to thermal inactivation. Temperatures of 88–99°C and 101–121°C are required to inactivate *Bacillus subtilis* and *Clostridium botulinum* spores respectively.

Therefore, solar-box cookers can be considered as an appropriate biomedical waste-disposal technology for clinics and small hospitals in those latitudes where there is a reasonable expectation of at least 20 min direct sunshine during each daylight hour.

CAPACITY BUILDING PROGRAMME FOR HEALTHCARE WORKERS- CHCWM

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In these times of heightened environment consciousness, addressing the issue of proper healthcare waste disposal is of paramount concern not only for environmentalists or other members of the health sector but also for the whole of society.

King George's Medical University, India was selected to be a priority site for the Global Environment Facility (GEF)/Ministry of Environment and Forest (MoEF)/United Nations Development Program (UNDP) Project which was initiated in May 2010. The Indira Gandhi National Open University (IGNOU), New Delhi, India in active collaboration with the World Health Organization (WHO) South-East Asia Region, has developed and launched a six-month certificate programme in healthcare waste management. Study Center for this Programme is created in the Department of Community Medicine and Public Health, King George's Medical University, Lucknow.



This Certificate Programme has been developed with the objective to equip the learner with the knowledge and skills to manage healthcare waste effectively and safely, and also safeguard the community against the adverse health impact of healthcare waste.

This course is being provided to the doctors, nurses, paramedics, and staff of the institutions who are involved in the Bio-medical Waste Management System.

Until now, more than 60 Healthcare Personnel from the institution have been registered for this course and have successfully completed and are contributing actively to the training, monitoring and management of the healthcare waste practices of the hospital.

PREVALENCE OF NEEDLE STICK INJURY AMONG HEALTH CARE WORKERS IN KATHMANDU, NEPAL

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This cross sectional study was conducted in three hospitals of Kathmandu to evaluate prevalence of needle stick injury among health care workers working in hospitals. Self-administered questionnaires and interview was conducted to collect data from health care workers and support staff respectively.

Study found that, 58.44% of the staffs were exposed to needle stick injury during their work in last one-year period. However only 35% of the injuries were reported to the immediate senior level staff. No prophylaxes were provided to the reported cases except tetanus toxoids. Only 55% of the staffs were fully vaccinated against Hepatitis B. Staff receiving blood borne pathogens exposure safety training was only of 18%.

The result indicates immediate need to establish an unit responsible for promotion of occupational health and safety including post exposure prophylaxis to deal with post needle stick injury cases because staffs working at the health care facility are at higher threat of obtaining serious diseases like Hepatitis B, infection of HIV and other communicable disease because of occupational exposure such as needle stick injury.

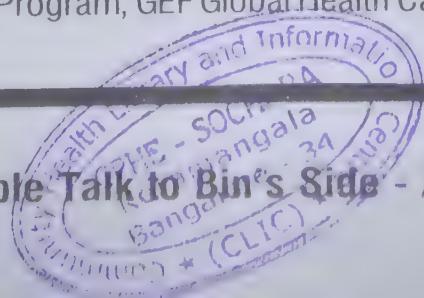
Key Words: Needle Stick Injury, Health Care Workers, Post Exposure Prophylaxis.

EFFECTIVENESS OF NON BURN TECHNOLOGY: SMALL SIZE AUTOCLAVE FOR INFECTIOUS WASTE TREATMENT

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Release of steam from autoclave is not sufficient to assure its proper function therefore validation of autoclave is important.

The study was conducted to assess the effectiveness of the autoclave used for infectious waste treatment in Gunja Man Singh Hospital. The commonly used and easily accessible autoclave (Life Brand) was used for the tests. Autoclave was validated as per Guideline on the microbiological challenge testing of health care waste treatment autoclave developed by United Nation Development Program, GEF Global Health Care Waste Project, 2010.





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Series of tests with three different indicators (autoclave tape, strip integrator and Biological Indicator) was conducted. It was found that small manual waste autoclave was able to disinfect the infectious waste at sterilization time of 25 minutes in cotton bag instead of steel drum. The parameter used was compatible to the manufacturer's guideline.

Manual autoclave is found to be effective and environment friendly technology for the treatment of infectious waste generated in small health care facility.

Keywords: Autoclave, Validation, Waste, Treatment, Small HealthCare Facility



Abstracts of Poster Presentations



ASSESSMENT OF BIO-MEDICAL WASTE MANAGEMENT PRACTICES IN THE GOVERNMENT AND PRIVATE HOSPITALS OF LUCKNOW CITY, UTTAR PRADESH, INDIA

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Introduction: The Bio-medical Waste Management (BMWM) is an integral part of infection control and hygiene programs in healthcare settings. Bio-medical waste poses serious threats to environmental health and requires specific treatment and management prior to its final disposal.

Methodology: A cross sectional study was conducted in eight different healthcare settings (four government and four private) of Lucknow city. Data were collected through field observations and interview method. Out of eight hospitals four were large healthcare settings as each had more than 200 beds and four were small each had less than 50 beds.

Results: The bio-medical waste management practices in the large healthcare settings ranges from satisfactory to good as they have sufficient infrastructure but practices performed in the small setting are very poor. All type of waste is collected in the same container.

Discussion: There are fundamental problems of small healthcare settings with respect to waste management, such as a lack of a comprehensive policy and strategy, the absence of proper infrastructure, inadequate knowledge and skills of health sector personnel.

Conclusion: In this study we conclude that in small healthcare settings of Lucknow city, wastes are not properly segregated, collected and disposed, which may lead to a negative impact on public health and on the environment.

Keyword: Bio-medical waste, infectious waste, disposal, healthcare setting, management

KNOWLEDGE, ATTITUDE, AND PRACTICES ABOUT BIOMEDICAL WASTE MANAGEMENT AMONG HEALTHCARE PERSONNEL

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Background: The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences and a significant impact on the environment as well.

Objective: The objective was to assess knowledge, attitude, and practices of doctors, nurses, laboratory technicians, and sanitary staff regarding biomedical waste management.



Materials and Methods: This was a cross-sectional study.

Setting: The study was conducted among the nursing homes of Lucknow city.

Participants: Medical personnel included were doctors (66), nurses (70), laboratory technicians (90), and sanitary staff (110).

Results: Doctors, nurses, and laboratory technicians have better knowledge than sanitary staff regarding biomedical waste management. Knowledge regarding the color coding and waste segregation at source was found to be better among nurses and laboratory staff as compared to doctors. Regarding practices related to biomedical waste management, sanitary staff were ignorant on all the counts. However, injury reporting was low across all the groups of health professionals.

Conclusion: The importance of training regarding biomedical waste management needs emphasis; lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal.

Keywords: Biomedical waste management, hospital, medical professionals

AWARENESS & PRACTICE OF BIOMEDICAL WASTE DISPOSAL & MANAGEMENT AMONG NURSES OF KGMU

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Materials & Methods; The study was done in 100 nurses including student nurses working in KGMU. 60 of them were student nurses, 40 of them were senior nurses. Then by asking questions related to biomedical waste management, the knowledge of nurses identified. Then they were divided in to three groups on basis of complete, incomplete and very little knowledge. Then subjects from each group were asked question that they actually follow the correct methods of biomedical waste management or not, according to the knowledge they have.

Result; It was found that 56 of the 100 nurses had full knowledge of waste disposal & management. 10 of them had very little knowledge of waste management. In 56 nurses of ,having full knowledge , 34 of them were senior nurses, 22 were student nurses. Now in these 56 nurses having full knowledge, 44 of them were confident that they not only have knowledge but also practice correctly the biomedical waste management. 12 of them do not practice sincerely.

Conclusion; Nurses who play an important role in biomedical waste management, need to be trained repeatedly. Not only knowledge of biomedical waste management is needed but also they should know its importance so that they could implement their knowledge.



BIOMEDICAL WASTE MANAGEMENT – AN EMERGING PROBLEM – A REVIEW

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“Biomedical waste is defined as the waste generated during the diagnosis, treatment or immunization of human beings or animals or in research activities”. It may include wastes like sharps, soiled waste, disposables, anatomical waste cultures, discarded medicines, chemical wastes like X-ray fixers and developers; lead foils, shields and aprons; sterilant solutions; disinfectants, and other chemicals; and, general office waste. Biomedical waste management is of a great importance due to its potential impact to environment and consequently to human health.

Various national and international agencies have shown their concern towards proper handling, treatment and disposal of biomedical waste. The quantity of waste generated is equally important. The use of disposable items has reduced the rate of infection but at the same time has increased the volume of the waste which needs to be disposed properly. A lesser amount of biomedical waste means a lesser burden on waste disposal work, cost-saving and a more efficient waste disposal system.

The segregation of waste at source is the key step and reduction, reuse and recycling should be considered in proper perspectives. Appropriate management of health care waste is thus a crucial component of environmental health protection, and it should become an integral part of hospital planning and designing.

INACTIVATING THE SMEARS OF MYCOBACTERIUM TUBERCULOSIS: METHOD ADOPTED FOR SAFETY OF LABORATORY STAFF IN A TERTIARY CARE HOSPITAL

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Introduction : The inactivation of smears that contain Mycobacterium tuberculosis for microscopy before removal of the material from a biosafety cabinet is an important safety factor in preventing the transmission of tuberculosis. The inactivating properties by 5% phenol in ethanol for smears containing M. tuberculosis were investigated.

Methodology : The study was conducted in the department of Microbiology Era's Lucknow Medical College & Hospital. The following tests were adopted to all the sputum samples positive for mycobacterium tuberculosis

- 1) Heat (flame) fixing test
- 2) Reagent test

Results : Flame fixing tests:-Materials from flame-fixed smears all remained viable after heat fixing.





Reagent test: After being fixed in 5% phenol in ethanol for 5 min, all smears tested (AFB-positive sputum concentrates) were nonviable.

Discussion: The incidence of TB infections in laboratory workers is estimated to be three to nine times greater than that in the general population. Because of the low infective dose of *M. tuberculosis* for humans (fewer than 10 bacilli represent a 50% infective dose) all clinical specimens from patients with possible TB must be considered potentially infectious.

Conclusion: All smears that may contain *M. tuberculosis* must be treated with 5% phenol in ethanol for 5 min within a BSC as a rapid and effective fixing and inactivating method. The recognition of potential hazards by laboratory staff and effective ways to control them in order to avoid laboratory-acquired infections.

Keywords: *Mycobacterium tuberculosis*, Method, Lab safety

BOTTLE-NECKS OF BIO-MEDICAL WASTE MANAGEMENT IN A TERTIARY HOSPITAL

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Introduction: Safe disposal of biomedical wastes is of paramount interest keeping in view the safety and health hazards of in patients and public in general. Sir Sunderlal hospital, Banaras Hindu University has approx 1200 beds and also caters to 2000-2500 OPD cases on daily basis and approx 400-600 kg of BMW gets generated on daily basis from the hospital needing early and timely disposal. The university is also going to open the country's largest Trauma centre within a month to take care of victims of road accidents and head injuries. The local unit of Center for pollution control is entrusted for safe disposal of BMW in strict accordance with Memorandum of Understanding between BHU and CPC. This paper aims to focus some pertinent areas of consideration which need focusing in a wider perspective and in also in view of BMW- amendment- 2011.

Methodology: Per day record of BMW disposal collected over a period of six months from 1st April — 30th September in a well defined proforma covering each word / unit was analyzed in terms of waste collected, types, quantity, problems faced and suggestions.

Result: Public interference in terms of ignorance was a great hazard. They played pivotal role in mixing of general daily non BMW with those to be disposed off. Timely disposal and daily record maintenance was also sometimes not adhered to. Man power was a main bottleneck and lack of re-orientation programs for health personnel's involved was also noted.

Discussion: To implement the revised BMW-2011 amendments a general increase in public and health personnel awareness is needed with streamlined disposal strategy. The place where wastes are disposed off also needs to be kept in mind and public in general and in - patients in particular to be educated via health education and medias regarding safe disposal of BMW.

Conclusion: General and specific technical problems concerning BMW disposal can be tackled with effective role of CPC and media and increasing the administrative awareness of hospital personnel's.

Key words: BMW, CPC, Safe Disposal, Orientation Program.





BIO MEDICAL WASTE MANAGEMENT CELL

STUDY OF CENTRALIZED TREATMENT FACILITY REGARDING BIO-MEDICAL WASTE MANAGEMENT AT KING GEORGE'S MEDICAL UNIVERSITY, LUCKNOW, INDIA

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Introduction: The Govt. of India promulgated the Bio-medical Waste (Management & Handling) Rules, 1998 and it became mandatory for all Healthcare facility to comply with the rules and the standards laid down under statutory regulations.

Aim: To study Centralized Treatment Facility regarding Bio-medical Waste Management at KGMU.

Methodology: This study was conducted at KGMU from January 2012 to June 2012, data was collected through interview method with the BMWM committee members, BMWM staff and waste handlers.

Result: General, incinerable, infectious plastic, sharp, glass, paper and linen sent for interim storage, treatment and terminal disposal at Central Collection & Treatment Site (CCTS). Two autoclaves, two plastic shredders and one paper shredder are installed for proper treatment of waste at the site.

Discussion: At KGMU bio-medical waste management was initiated under GEF/UNDP-MoEF Project in August 2010. Under this project a well-developed Bio-medical Waste Management System (BMWM System) was established. The autoclaves installed at the CCTS are quality tested once in a week as per CDC-2004 guidelines with biological indicators.

Conclusion: The study concludes that all the infectious plastic, Sharp, glass waste is treated in the CCTS.

Keywords: Bio-medical waste, treatment, disposal, autoclave.

TITLE-DENTISTRY WITH OR WITHOUT MERCURY

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Silver amalgam is one of the most successful restorative materials in the history of dentistry for almost two centuries. Nevertheless, due to mercury toxicity, its safety for both the patients and the dental personnel has been questioned intermittently. Mercury released from dental amalgam is found to be responsible for a plethora of systemic diseases, though the degree may vary significantly. Manipulation of the material in correct ratio, proper disposal of the material and many hygiene recommendations must be followed to avoid unnecessary exposure risks. The dental amalgam has been banned in many of the western countries. There are lot of alternatives to this restoration. Cast metal restorations don't just fill the tooth; but also support the remaining tooth and are the longest lasting dental restorations. Composite and ceramic restorations are highly aesthetic and have got improved mechanical properties also.





INTENSIVE AUDIT DRIVE OF BIOMEDICAL WASTE AT DR. BABA SAHEB AMBEDKAR HOSPITAL. GOVT. OF DELHI

Renu Gur, Senior Specialist and Head,
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Introduction: Biomedical waste (BMW)management is an integral part of any health care facility. It is a by-product generated during diagnosis, treatment, interventions and management of patients. The quantum of BMW can be minimised and effectively managed if there are continuous surveillance mechanisms and regular audits. One such intensive BMW audit drive was undertaken at Dr. Baba Saheb Ambedkar Hospital, a 500 bedded hospital in Northwest Delhi.

Methodology: A prospective study involving daily audits was carried out by the BMW team including doctors from the department of Microbiology. A form was designed to record the observations on daily basis from the identified generation sites. After discussion, problem areas were identified and corrective action was planned. At the end of every month audit report was discussed in the BMW committee and sent to the Medical Superintendent for necessary action.

Results: A total of 280 rounds were taken of different areas in the hospital during a period of 9 months (Jan -Sept 2013). The most common problem was improper segregation (19.28%); followed by overfilled sharp containers (3.57%), non functional needle destroyer (3.57%) and non availability of bags (1.43%). Documentation of BMW generation, segregation and transport was improper in 19.64% areas.

Discussion: Daily discussions of observations and prompt rectification helped to maintain a constant sense of awareness of the BMW rules and regulations. The involvement of doctors conducting the audits and their direct interaction with hospital staff and onsite training helped to enforce the BMW rules more stringently.

Conclusion: Proactive measures concerning BMW management, timely interventions and involvement of all the hospital staff go a long way in effective management of biomedical waste.

Key words: biomedical waste, audit, rounds, segregation, training





BIOMEDICAL WASTE: A POTENTIAL THREAT TO HUMAN HEALTH AND ENVIRONMENT

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The term "Biomedical Waste" may be defined as "Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological". In the recent times the biomedical waste and its management has recently emerged as a major issue of apprehension not only to hospitals, nursing home authorities but also to the global environment. The biomedical wastes are generated in many ways from any health care units or local units which depend upon a number of factors that represent waste management methods, type of health care units, occupancy of the healthcare units, healthcare units specialization, the record of the ratio of reusable items that may be in use, availability of hospital infrastructure and resources, the patient caring system in hospitals, etc. The hospital waste is a major threat to health in terms of the health care workers, public and flora and fauna of that locality or region. The problems of the biomedical waste disposal in the hospitals and other health-care institutions have become a burning issue in global decaying and maintaining sustainability issue of any region.

According to the Government of India major specifications to the hospital biomedical waste management has been imparted for hospital hygiene and maintenance activities. The major concern involves management of range of activities, which are mainly part of important functions, such as collection, transportation, operation or treatment of processing systems, and disposal of biomedical wastes. However, contrary speaking much of the practices in the hospitals of Lucknow region are still under scrutiny and it is advisable to properly monitor the aspects of biomedical situations before it becomes alarming.

Key words: Biomedical waste, hospital, environment, management, health.

KEY ROLE OF TRANSPORTATION IN BIOMEDICAL WASTE MANAGEMENT FROM GENERATION TO STORAGE SITE

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Introduction : During transportation, the chances of bio-medical waste coming in contact with the health care workers, patients, visitors, sanitary workers, waste handlers, public, rag pickers and animals are high.

Material and methods : The study was conducted over a period of seven months (April 2013—October 2013) on daily basis during the morning shift. The focus was on transportation from 39 generation sites in the hospital to the





biomedical waste storage site. It included the measures to be taken during transportation of biomedical waste from generation site to biomedical waste storage site which were recorded in a predesigned performa.

Results : On evaluation of daily records, it was found that the waste collection bags had not been collected in few areas. It varied from 0-0.11% for incinerable waste (yellow), 0.44-0.82% for infectious waste (red), 0.55-0.71% general waste (black) and 0.22-0.41% sharp containers. The sharp containers were not properly closed in 0 to 0.3%. Bags were unlabelled in 0.66-1.12%, uncovered trolleys 1.22-2.25% and overloaded collection waste bags 1.0-2.05%. The percentage of staff wearing Personal protective equipment (PPE) varied from 1.22-1.84%. Sanitary workers did not report for duty in 1.94-2.0%.

Discussion : Transportation of biomedical waste is the most crucial step in its management. The health care workers were trained about the occupational exposure, spillage policy and importance of wearing personal protective equipment. Regular training program for all the sections of Health care workers with special emphasis for the waste handlers is needed.

Conclusion: Adequate care should be taken to ensure that the bio-medical waste is transported from the generation sites to the storage site without any spillage and in an environment-friendly manner.

Key words: Transportation, training, generation site, storage site

GREEN CAMPUS MODEL

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In this paper we propose a Green Campus Model (GCM) for health care waste management.

With a growing population, the lack of space in cities for waste disposal poses challenges for the environment and the health of the community. Hospitals contribute to large amounts of human fecal waste as well as biodegradable kitchen waste. Traditionally, the landfills for such waste are among the largest anthropogenic emitters of Methane gas which contributes to greenhouse effect.

Due to spatial constraints and effects of waste degradation byproducts, it is vital to think of and formulate efficient waste management systems. Human fecal matter is an abundant class of waste and its management is a challenging task. A method by which this form of waste can be converted into deliverable energy has a twofold significance. Such a method can be a crucial step to answering the demand for efficient waste management as well as the demand for energy.

Green Campus Model is an eco-friendly, sustainability related activity. Organic materials with recoverable energy content are decomposed and their byproducts are utilized. The methane gas released in the process is stored and used for energy supply. The solid organic matter can be recycled as mulch or compost for agricultural or landscaping purposes. This waste management can supply institutions with enough landfill gas to enable them to receive 80-85% of their energy from this form of energy source alone. The gas can stabilize the fluctuating energy costs. Sustainability is also ensured by a significant reduction in the greenhouse gas emissions through the proposed model.

Key Words: Green campus, eco-friendly, waste-management.





BIO MEDICAL WASTE MANAGEMENT CELL

TO STUDY THE INCIDENCE OF NEEDLE PRICK INJURY AMONGST HEALTH CARE WORKERS IN A TERTIARY CARE HOSPITAL.

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Needle prick injury poses a significant healthcare hazard amongst the health care workers. There is an increased risk of occupational transmission of blood borne pathogens subsequent to accidental needle prick injuries. Various studies indicate that the incidence of needle prick injury is on rise in the community of healthcare providers. The study was conducted in the department of anaesthesia, general surgery, gynaecology, orthopaedics and trauma centre of a tertiary care hospital to determine the incidence of needle prick injury, awareness amongst various health care workers about transmission of hepatitis B & HIV the two most dreaded diseases subsequent to needle prick injuries and awareness for post exposure prophylaxis and availing the same. Incidence of needle prick injury, awareness of complication and post exposure prophylaxis, post exposure prophylaxis if taken were recorded on a semi-structured proforma and will be presented.

A STUDY ON THE STATUS OF HEALTH CARE WASTE MANAGEMENT AND INFECTION CONTROL IN HEALTH CARE SETTINGS OF ANEKAL TALUKA, BANGALORE URBAN DISTRICT

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Introduction : Health care waste (HCW) is a potential source of infectious diseases and may also root to environmental pollution and this can be minimised by implementation and execution of standard Health Care Waste Management (HCWM) procedure. The study was accomplished to observe and describe HCWM and infection control (IC) practices in health care settings (HCS).

Methodology : A cross sectional study was conducted in Anekal taluk of Bangalore Urban district by visiting 37 HCS during August and September, 2013. Data was collected using a standard check list for HCWM and IC related practices (segregation, storage, collection, transportation and disposal). Descriptive analysis was done using Microsoft Excel and SPSS version 20.

Result : Anatomical waste was segregated in 88.9% (n=16) out of 18 HCS, sharp waste segregated in 83.8% (n=31), general waste in 94.6% (n=35) HCS. Sharp waste containment was satisfactory in 51.4% and sharp





waste disinfection/treatment in 45.9% (n=17) of HCS. Infected plastic waste was being disinfected 48.6% (n=18) HCS. Appropriate final disposal of sharp waste was carried out in 89.2% (n=33), infected plastic waste in 64.9% (n=24) and soiled waste in 83.8% (n=31) HCS. Sharp waste disfigurement was done at 75.7% (n=28) HCS and infected plastic waste disfigurement in 56.8% (n=20) HCS.

Conclusion : The study on the status of HCWM and IC illustrates that all the guidelines are not being followed at all the HCS and there is a need to strengthen the HCWM for better enforcement of guidelines to ensure the human health and environmental protection.

Keywords: Healthcare, Waste Management, Waste Disposal, Segregation, Containment, Disinfection

MANAGEMENT AND DISPOSAL OF CYTOTOXIC DRUG CONTAMINATED WASTE IN DEPARTMENT OF RADIOTHERAPY, K.G.M.U. LUCKNOW

Prakash C, Pant MC, Srivastava K, Jamal N, Kumar S, Singh S, Srivastava PK, Gupta S, Gupta R, Kumar R

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Introduction: Cytotoxic drugs are primarily used as anti- cancer drugs because they are toxic to cells. Not only in oncology department but other department also started using cytotoxic drugs. Due to their mode of action, practically all organisms are vulnerable to damage, with teratogenicity being the greatest concern at such levels.

Methodology: This study was conducted in the Department of Radiotherapy, King George's Medical University (KGMU). KGMU is 100 year old tertiary healthcare institute. Data was collected by observation method and interview with Waste handler, Bio-medical Waste Management Cell Staff. The study period was 3 month from August 2013 to October 2013.

Result: In over 3 month, total 4,383 kg waste material had been collected from department of radiotherapy. Out of which non contaminated waste having greater proportion followed by contaminated glass and plastic waste material and collected by the Bio-medical Waste Management Cell staff and transported to the Central Collection & Treatment Site (CCTS) for final Disposal. Cytotoxic contaminated glass waste are treated with 10% Hypochlorite solution while at the point of generation plastic waste are treated with 10% Hypochlorite solution. Expired/ unused cytotoxic drugs return to the manufacturer.

Conclusion: In department of radiotherapy around 3000 patients per year are receiving different type of cytotoxic drugs. Thus the waste contaminated with cytotoxic drugs generate in huge amount. Liquid cytotoxic waste in the form of urine, fecal matter from patients needs special attention as there is no existing method to deal with it.

Keywords: Cytotoxic drug, bio-medical waste, human health, glass waste.





BIOMEDICAL WASTE MANAGEMENT AMONG INDIAN DENTIST: A CROSS SECTION STUDY ON KNOWLEDGE, ATTITUDE AND PRACTICES OF HEALTH CARE PROFESSIONALS

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Background: Biomedical waste has become a serious health hazard in many countries, including India. Infection control in commercial laboratories has attracted increasing interest in the past 18 to 24 months as evidenced by new laboratory control programs that have been recently initiated. This study was conducted as a national survey among institutional, commercial and charitable pathology laboratories whether working in government or private sector in India. A self-administered questionnaire was designed to obtain knowledge, attitude and practice about procedures used for biomedical waste management and prevention of cross-infection in laboratories. The questionnaire included data on socio demographic characteristics, biomedical waste management practice, knowledge, practice of infection control procedures, sterilization, wearing of gloves, mask, disposal method of contaminated materials, disposal method of sharps along with temperature control mechanisms etc.

Results: Of these, 523 responded; out of which 466 questionnaires were included in the analysis, remaining were some types of errors. Identity of the respondents was kept confidential. A total of 800 questionnaires were distributed. Of these, 523 (65.4%) responded. Out of these, 466 questionnaires were included in the analysis, remaining were some types of errors.

Discussion: In the present study, almost all the respondents had knowledge about waste management guidelines and 34.5% respondents were aware about any legislation to the lab waste management. Majority (72.5%) of the respondents had knowledge about the importance (very high) of washing hands before and after using gloves. This was almost similar among the respondents of institutional (75.3%) commercial (64.2%) and charitable (63.6%). The practice of washing hands before and after using the instrument was significantly higher among the respondents. More than one third (41.2%) of the respondents were using disinfecting solution and detergents method for pre-sterilization cleaning and asepsis storage. This practice was higher among the respondents of institutional (42.6%) followed by commercial (37%) and charitable (36.4%) labs. Also included, about half (52.1%) of the respondents were washing slides for smear detergent/hypochlorite followed by detergent wash and autoclaved at 1210C for 1 hour, if reused. More than one third (47%) of the respondents were keeping Glass tubes (EDTA/Fluoride vials) after washing with detergent/hypochlorite followed by detergent wash and autoclaved at 1210C for 1 hour, if reused. This practice was almost similar among the respondents of charitable (48.5%) institutional (49.1%) and commercial (37%) labs.

Conclusions and Recommendations: Universal work precautions involve the use of protective barriers such as gloves, gowns, aprons, masks, or protective eyewear, which can reduce the risk of the health care worker's skin or mucous membranes to potentially infective materials. It is recommended that all health care workers take precautions to prevent injuries caused by needles, scalpels, and other sharp instruments or devices. The present study revealed appreciable knowledge and attitude regarding infection control procedures and biomedical waste management among Indian Pathologists.



KNOWLEDGE, ATTITUDE AND PRACTICES OF HEALTH CARE WORKERS REGARDING HEALTH CARE WASTE MANAGEMENT IN TWO GOVERNMENT HOSPITALS OF NEPAL

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Mahesh Nakarmi², Sita Thapa³,
Shrawasti Karmacharya⁴, Prerana Dangol⁵

The aim of the study is to investigate healthcare workers knowledge, attitude and behavior towards health care waste handling. The workers were employed in two government general hospitals of Nepal, where safe health care waste management programs had been implemented for over a year. Self-administered questionnaires, observation checklists and focus group discussion guideline were used.

Significant association was found between waste handling behavior and reinforcing factors, however, there was no association between knowledge, attitude and enabling factors. Ward observations showed a need for improved segregation and management practices, suggesting that self-reported behavior did not predict actual waste handling behavior.

Reinforcing factors such as motivation and regular monitoring will strengthen health care waste management systems in the hospital.

Keywords: Healthcare worker, Behavior, Waste

DIAGNOSTIC ASSESSMENT OF HEALTHCARE WASTE IN HOSPITALS OF KATHMANDU, NEPAL

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Mahesh Nakarmi²,
Saraswoti Thakuri³, Nimesh Dhakal⁴, Sita Thapa⁵, Prerana Dangol⁶

Health care waste management in Nepal is still in infancy phase. Most of the wastes from healthcare institute (HCIs) are being disposed haphazardly.

Cross sectional study was conducted in 12 hospitals of Kathmandu to assess the generation of healthcare waste in Kathmandu. Stratified sampling technique was used for the selection of hospitals. The study was based on both the quantitative and qualitative assessment.

The generation rate of total healthcare waste per bed in Kathmandu was found to be 1.29 kg per day per bed (Standard deviation = 0.82). So waste generation was ranges from 0.47-2.11 kg/ day/bed. The total waste includes 72% of general, 22.9% of infectious, 1.13% and 2.4% of pathological waste. If the sustainable segregation is expected to be developed at the source then the risk waste will reduced from 77% to 28% of the total waste. Only 28% of the wastes are the responsibility of the hospital to manage and remaining can be sent to municipal stream. But nowadays, the scenario is complicated due to the mixing of general and contaminated waste. This will increase the operational costs leading to economic burden to the hospital.



Also 83% of the hospitals have very poor waste management system and 17% of them have poor waste management system.

Keywords: Kathmandu, Healthcare waste, Hospitals, Diagnostic Assessment, Waste Generation

PLASTIC IN HEALTHCARE WASTE: AN ISSUE TO ADDRESS

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Mahesh Nakarmi², Saraswoti Thakuri³, Shrawasti Karmacharya⁴**

The general objective of the study is to assess the different type of plastic found in health care waste and addresses its hazard. A desk study was carried out.

According to SPI, the plastic has been classified into seven types. Among them 3, 6 and 7 are considered as unsafe plastic. Most of the medical equipments used in health care facilities are made from unsafe PVC (Code 3 Plastic). PVC containing products includes tubing, urinary drainage catheters, blood pressure seals and ECG electrodes.

Healthcare patients, especially children, may be at risk from the use of medical devices made of polyvinyl chloride (PVC) plastic.

Incineration of PVC waste contributes significantly to release of POPs specifically dioxin and the potential for recycling PVC is minimal.

Keyword: Plastic, healthcare waste, PVC .

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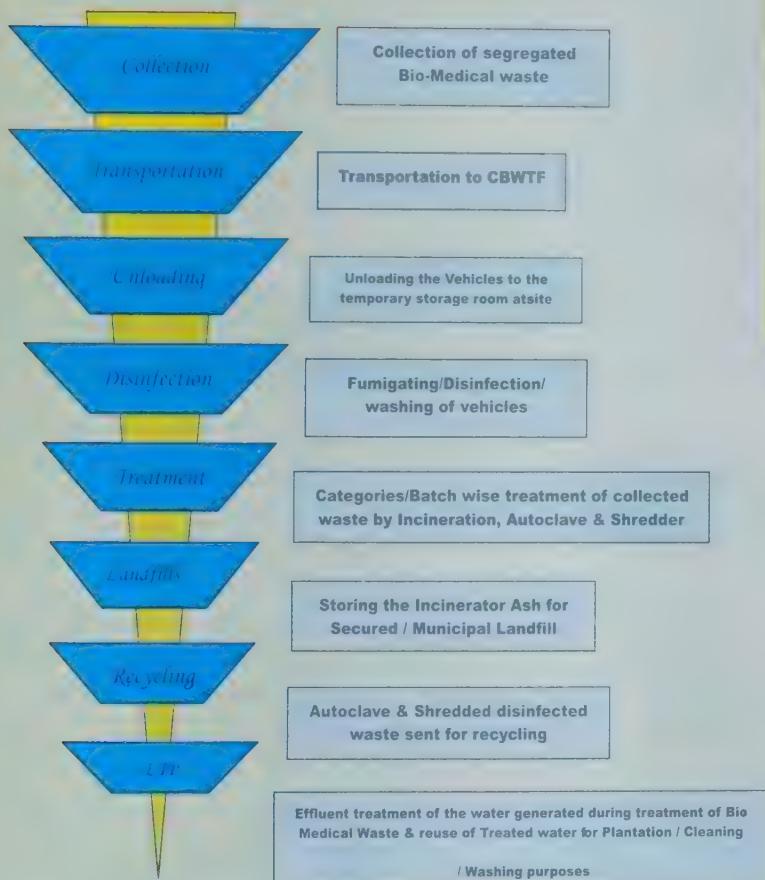
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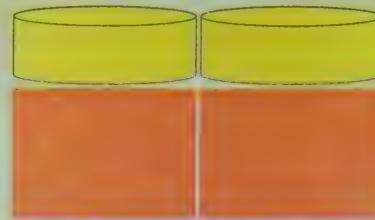
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In Incineration process the waste is thermally decomposed in the primary chamber at a temperature of 800+/-50°c. The gaseous products (volatile matter) are completely oxidized in the secondary chamber at a temperature of 1050+/-50°c. The flue gases from secondary chamber are further sent through venturi scrubber (air pollution control device) where particulate matter and acidic pollutants are scrubbed.. The system runs on PLC as well as manual mode.

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The system has pre vacuum process where waste is subjected to temperature of more than 135°c and a pressure of 31 psi with a residence time of 30 minutes. The operation are controlled by P L C system. The systems fully operates as per the operating parameters

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The auto claved waste such as tubes, catheters, intravenous sets is shredded and is further made in the form of granules.

→ Shredded waste for Recycle



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- Microwave remains the cutting edge technology for management of category 3, category 4 & category 6 waste as specified by CPCB across the Gazette Notification No. S.O.746 (F) dated 16th October, 1997 and amendments thereafter. • Also Microwave is an approved technology by the Government of India and has established its mandate also in the European and American societies. • 'Desk Top' Microwave is a mandatory device in the smallest of Healthcare Units in almost the entire developed world. • Microwave utilizes minimum infrastructure, power, accessories and its 'Stand alone' character makes it the most viable and acceptable CSSD device.

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Bio-Medical Waste Plastic Shredders



- Rotary Shredding system made of Mild Steel duly painted, fitted with alloy steel blades, suitable for treating plastic waste.
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- No. of Blades: 4 (2 fixed & 2 Rotor) • HCHCR tipped, Alloy Rotor & fixed blade, heat treated to avoid damage. • Balanced rotor shaft for vibration damping. • Electrical Requirements: 5HP, 400/440V, 3 Phase 50 cycle AC supply a2

Price on Request!

Horizontal Autoclaves/Hydroclaves



- The unit has outer chamber, inner Chamber, Boiler, Lid and Jacket- all made of 304 grade stainless Steel. For controlling sterilization cycle, a three way valve or a multiport valve- made of S. S. is provided. It is supplied complete with vacuum breaker, water level indicator, steam trap an automatic pressure control switch. The whole unit is mounted on a robust tubular stand.
- Capacity: 100 Liters. Operators on Single Phase, 230 Volts A.C. Supply.

Working Pressure:-

- The pressure inside the chamber is variable from 5 psi. To 30 psi. But the normal recommended pressure for sterilization process is 15 psi
- Working Temperature : 121°C. • Hydrotest Pressure : 2.5 Kg/cm sq. G (35 psi)

Price on Request

Heavy Duty Bio-Medical Waste Incinerators



- Three chambered Incineration system to destroy harmful biomedical waste like used cotton, swabs, gauges, discarded medicines, vials, blood soaked bandage etc.
- Floor Mounted, Front Loading type with Scrubber Unit.
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- Combustion Efficiency: 90%, Heat loss fraction: 0.05
- Technological break through to build complete system in compact size, no civil work and instant installation at site.
- Refractory lining suitable to withstand temperature 14000 C
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- Chimney: 30 meters. Motorized waste doors with manual charging system.
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Price on Request

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Price in Rs. 2460.00

BMW TRANSPORTATION SYSTEM MOBILE BIN



- This trolley is specially designed to transport Bio Medical Wastes for re-cycling.
- It has a specially designed 2 part cover to maintain sterile environment.
- The mobile bin with four wheel drive.
- Collection Box will be made up of original PP sheet and this box will be shift in the MS frame of Trolley.
- Overall Dimensions (inch) Box As per demand size may be change.
- Length : 48" Width : 47" Height : 37"
- Thickness of Sheet - Bottom - 8 mm, Lid - 6 mm, Side- 6 mm

Price in Rs. 26000/-

SHARP CONTAINER



- This is container is designed for Bio-Medical Waste Sharp collection such as syringes, blades etc
- Flask shape for ease and convenience.

Capacity : 5 Ltrs. Price In Rs. 560.00

Equipments & Consumables

MULTI PURPOSE FOUR WHEEL TROLLEY



- Frame Works is made of 3/4" x 3/4" 202 grade 16 g ss sec
- It has 5 rings to hold bins with SS handle branching out to accommodate as sharp container
- HDP syringe bin (5 Lit. Capacity) and a needle destroyer
- Bins: Injection/Below Molded, HDPE Plastic Bins with Lid in 5 different colours i.e. Red, Yellow, Black, Blue & White of 25 Ltrs. Capacity each

Available Capacity 12 ltrs. : Rs. 16000/-

BIO HAZARDOUS DISPOSABLES BAGS



- All bags are customized with bio-hazard sign and pre-printed as per CPCB norms/BMW Management Rules 1998.
- All bags of durable 30 micron thickness ensuring puncture proof and liquid leakage during bag drag.
- Shelf life of bag 18 months. Available in CPCB defined colour code of Yellow, Red, Blue and Black

Available Capacity : 20/25/40/60 ltrs. Price is Rs. 165/- per kg.

PROTECTIVE GEAR

EYE SAFETY GOGGLE :



- This is used for safety purpose.
- The goggles are durable and easily adjustable as per your requirements.

Price in Rs. 160.00

CUSTOMIZED BMW HANDLING HELMET & GUM BOOT

SAFETY HELMET



- This is used for safety purpose.
- Material can be used ABS, HDPE, PP.

SAFETY GUM BOOT



- This is used for safety purpose.
- Material can be used PVC.

Price in Rs. 250.00 (Helmet)
Price in Rs. 350.00 per pair (Gum Boot)

PERSONAL PROTECTION GEAR

THICK LATEX GLOVES:



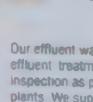
- Powder Free exam grade latex gloves
- 12" length for Extended Protection
- High Risk Glove, Tear Resistant
- Textured Grip, Ambidextrous
- Excellent for Automotive Technicians, Painters
- Furniture Refinishing, Janitorial & Agricultural uses.

Price in Rs. 68.00 per pair
Price in Rs. 79.20 per pair
Price in Rs. 134/- per pair

DISPOSABLE APRON

- Disposable Plastic Apron is made from HMHD plastic.
- This plastic material is blend of HMHD & LDPE granular.

DISPOSABLE FACE MASK



- Disposable face mask made of non woven material, sterilizable for single use, standard box provided with four straps on four corner or elastic on the both side for holding the face mask on the mouth and nose area for protection.

Our effluent water treatment plants are designed and implemented by our team of experts. Industrial effluent treatment plants are constructed under strict quality control methods, supervision and inspection as per the international norms. We supply aerobic as well as anaerobic effluent treatment plants. We supply equipments having stout design, material used is corrosion resistant that requires minimum maintenance.

Our effluent treatment plants deal with the following

- The total quantity of effluents.
- Nature of effluents in any whether gaseous, liquid or solid.
- The flow rate and temperature.
- The total suspended solids.
- Level of COD, BOD, Dissolved Ph value.

CATALOGUE

With best compliments from :



BMW

solutions from :

STAR ENTERPRISES
&
AWADH ENTERPRISES

Regd. Office : 476/119 B1, Purani Bans Mandi, T.G. Hostel Road, Khadra, Lucknow - 226 020

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WHOLE BODY HISPEED SPIRAL CT SCAN CENTRE

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Trauma Center KGMC Lucknow**

AMDC



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Facilities Available

16Slice & Spiral Single Slice CT; CT guided Biopsy/ FNAC and Routine Cases.
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**Direct Contact to
CT Scan / Digital X-Ray / USG : 7505584777**

ROUND THE CLOCK SERVICES



In collaboration with Lucknow Nagar Nigam under PPP model
NOC Granted by UP Pollution control Board, Lucknow



A COMMON BIOMEDICAL WASTE TREATMENT FACILITY (CBWTF) FOR COLLECTION, TRANSPORTATION, TREATMENT AND DISPOSAL OF BIO MEDICAL WASTE IN LUCKNOW NAGAR NIGAM AREA

(The Latest State of the art technology based incinerator of 300kg/Hour,
Autoclaves 1000liter, Shredder 100kg/Hr,
Effluent Treatment Plant 20KLD with dedicated fleet of Vehicles)
has been setup in Lucknow

The facility will start functioning in last week of December, 2013



Incinerator



Shredder



Autoclave



Vehicles



ETP



DG SET

For Detail Contact:

SMS WATERGRACE Mediwaste Mgt P Ltd

Office: B-4/184, Vishal Khand, Gomti Nagar, Lucknow

Contact : 0522- 4044596, E-mail: smswatergracelko@gmail.com

Mr. Kamlesh Kumar : 9935264880 Mr. Bipin Srivastva: 9415547774

AWADH ENTERPRISES

ADDRESS

**Tajvddinpur Auraila
Madiyahu Jaunpur, U.p.**

Mob.: 9452663132

Central Collection & Treatment Site (CCTS)
Bio Medical Waste Management Cell
Gandhi Memorial & Associated Hospital, KGMU UP, Lucknow



29.11.2010

Central Collection & Treatment Site (CCTS)
Bio Medical Waste Management Cell

Gandhi Memorial & Associated Hospital, KGMU UP, Lucknow



